ES&S Unity 3.2.1.0
VSTL Certification Test Plan

**Prepared for
Election System & Software
11208 John Galt Blvd.
Omaha, NE 68137
EAC Application # ESS0703**

Version 2.0

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			
VVS		**VVSG**	
Vol. #	**Section(s) #**	**Vol. #**	**Section(s) #**
1	2, 3, 4, 5, & 6	1	2, 3, 4, 5, 6, & 7
1	9.6.2.1	2	1.8.2.1
2	2, 3, 4, 5, & 6	2	2, 3, 4, 5, & 6
2	Appendix A	2	Appendix A

iBeta Quality Assurance is accredited for Voting System Testing under:

U.S. Election Assistance Commission
VSTL

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

NVLAP®

NVLAP LAB CODE 200749-0

3131 South Vaughn Way, Suite 650, Aurora, Colorado, 80014

Version History				
Ver #	Description of Change	Author	Approved by	Date
v.1.0	Initial release to the EAC	Carolyn Coggins	Carolyn Coggins & Sue Munguia	9/18/09
v.2.0	Non-significant edits or corrections are made without listing here. Significant updates from the initial submission include: • Table 5- Delivery of Letter etc. to EAC • Table 17 Clarification text added: " sign in" and "M100" • Section 1.4.3.4 update Max candidate/counters, Max contest in a ballot style • Section 1.4.3.5 update Max ballot styles per precinct • Section 3 - update all tables; add VSS references • Section 4.2 correct reference to table 12 • Section 4.4.1 & Appendix A added clarification of matrix • Section 4.5 add clarification language to the EoT process • Section 4.8 CM review aid • 7.1.6 add detail to Security Test Method • Appendix A - 2.4.3.1.f revised comment • Various locations, add "M100" to test case references to diffentiate Unity 3.2.1.0 & Unity 3.2.0.0 testing	Carolyn Coggins Jenn Garcia Kevin Wilson	Carolyn Coggins & Sue Munguia	11/12/09

This Test Plan follows the format identified NOC 09-001

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1 Introduction

This Test Plan identifies iBeta Quality Assurance's (iBeta) approach to VSTL Certification Testing of the Election System & Software (ES&S) Unity 3.2.1.0 voting system to the Voting System Standards 2002 (VSS 2002). The purpose of this plan is to document the scope and detail the requirements of certification testing tailored to the design and complexity of software being tested and the type of voting system hardware.

The ES&S Unity 3.2.1.0 voting system has been submitted to iBeta for testing to support ES&S' application # ESS00703 (originally identified as Unity 3.0.1.0 w/ ATS 1.3) to the US Election Assistance Commission (EAC) for certification to the VSS 2002. This application is a change to the EAC certification **ESSUnity3200** voting system. Per the process outlined in VSS 2002 v.1: 9.5.2 *Modifications to Qualified Systems,* ES&S is submitting the following:

Modifications to ESSUnity3200 Configuration in Unity 3.2.1.0
Hardware and Firmware changes to the Unity 3.2.0.0 Certified System for Unity 3.2.1.0:
- Addition of the M100 Hardware v.1.3.0 and Firmware v.5.4.0.0
- ERM v.7.5.5.0 is a change to address Issue #104 transferred from Unity 3.2.0.0 (ERM v.7.5.4.0)

Functional changes to Unity 3.2.0.0 Certified System for Unity 3.2.1.0:
- Modification of the work environment to permit networking of PCs running the Unity EMS applications in both a peer-to-peer and client/server configuration
- Incorporation of the system limits of the M100

Document changes to Unity 3.2.0.0 Certified System for Unity 3.2.1.0.
- Unity 3.2.1.0 System Overview,
- Unity 3.2.1.0 System Limits (incorporating M100 limits)
- Unity 3.2.1.0 Windows Hardening documentation addressing networking of EMS PCs
- All M100 documents; including
    - System Functionality Description
    - System Hardware Specification
    - Software Design and Specification
    - System Operator's Procedure
    - System Maintenance Manual
    - Test Cases
    - Training document
    - Build documents

Unchanged configuration of the Unity 3.2.0.0 Certified System in Unity 3.2.1.0
Election Management System software*:*
- Audit Manager (AM) v. 7.5.2.0
- Election Data Manager v. 7.8.1.0
- ES&S Ballot Image Manager (ESSIM) v. 7.7.1.0
- Hardware Programming Manager (HPM) v. 5.7.1.0
- AIMS (Automark information Management System) v. 1.3.157
- LogMonitor v.1.0.0.0

Precinct Hardware and Firmware
- DS200 Hardware v. 1.2.0, v. 1.2.1, Firmware v. 1.3.10.0, (Linux Kernel 2.6.16.27)
- Model M650 Hardware v. 1.1, v. 1.2, Firmware v. 2.2.2.0, (QNX Kernel 4.25)
- AutoMark Model A100-00 Hardware Rev. 1.0 Printer Engine Board (PEB) 1.65 Single Board Computer (SBC) 1.0, Firmware v. 1.3.2906 (WinCE 5.0.1400)
- AutoMark Model A200-00 Hardware Rev. 1.1 Printer Engine Board (PEB) 1.65 Single Board Computer (SBC) 2.0, Firmware v.1.3.2906; (WinCE 5.0.1400)
- AutoMark Model A200-00 Hardware Rev. 1.3.1 Printer Engine Board (PEB) 1.65 Single Board Computer (SBC) 2.5, Firmware v.1.3.2906; (WinCE 5.00.19)
- AutoMark Model A200-00 Hardware Rev. 1.3.1 Printer Engine Board (PEB) 1.70 Single Board Computer (SBC) 2.5, Firmware v.1.3.2906; (WinCE 5.00.19)

Central Count Hardware and Firmware
- Model M650 Hardware v. 1.1, v. 1.2, Firmware v. 2.2.2.0, (QNX Kernel 4.25)

Due to the October 2008 suspension of SysTest Labs (SysTest) in the middle of various Unity certification efforts, ES&S was authorized by the EAC to transfer their application for certification of the Unity 3.2.1.0 (originally identified as Unity 3.0.1.0 w/ ATS 1.3) to iBeta. With the addition of M100 precinct counter Unity 3.2.1.0 includes all the of paper ballot voting systems contained in the Unity v.4.0.0.0 voting system. At the time of the suspension the Unity v.4.0.0.0 test plan was approved by the EAC and a substantial amount of relevant testing had been successfully completed. ES&S petitioned the EAC to assess the testing performed by SysTest for consideration of reuse. The EAC documented their approval of the following assessment process in the *8-04-09 Ltr to ESS reuse of testing final*:
- iBeta is to review any TDP documents that have changed since the submission of the Unity 3.2.0.0 TDP. In addition, iBeta is to review all material related to the M100 optical scanner in order ensure all required information is present.
- iBeta will conduct a 3% review of the ES&S source code for the M100 voting system. This review will focus on important functional sections of the code in order to determine the depth and focus of source review conducted by SysTest. iBeta will provide a recommendation to the EAC regarding the reuse of the source code review conducted by SysTest. The EAC will then issue a decision regarding the reuse of the source code review conducted by SysTest..
- The EAC Technical Reviewers will review and assess the Functional, Accessibility, Maintainability, Accuracy, and Reliability test summary reports provided by SysTest on the M100. The EAC will issue a decision regarding the reuse of this testing.
- Applicable areas from the Unity v.4.0.0.0 Test Plan may be used as well as applicable areas from the approved Unity 3.2.0.0 test plan. However, iBeta must issue a Unity v.3.2.1.0 test plan. The EAC will review and approve a full test plan provided by iBeta.
- SysTest shall provide the appropriate test summaries for all items that are accepted for reuse.

Non-core hardware environmental testing is outside SysTest's test accreditation scope as a VSTL. SysTest's methods for validating the qualifications of the subcontractor laboratories was provided to the EAC and considered in their decision to permit reuse of the non-core environmental testing. SysTest conducted the non-core safety and hardware environmental assessments and testing with the following subcontractors:
- Compliance Integrity Services 1822 Skyway Drive Unit J, Longmont, Colorado 80504
- Criterion Technology 1350 Tolland Road, P.O. Box 489, Rollinsville, CO 80474
- Percept Technology Labs 4735 Walnut St. #E, Boulder, CO 80301
- Sun Advanced Product Testing (APT) 1601 Dry Creek Drive Suite 2000, Longmont, CO 80503

The Physical Configuration Audit (PCA) of the ES&S Unity 3.2.1.0 shall incorporate use of the baseline documents certified in Unity 3.2.0.0. New M100 Technical Data Package (TDP) documents and changes to the Unity 3.2.0.0 baseline shall be reviewed in PCA Document Review. The 3% PCA Source Code Review Assessment shall be performed. The results of this assessment with a recommendation shall be submitted to the EAC. The EAC will direct iBeta if the SysTest Source Code Review may be accepted for reuse.

A Functional Configuration Audit (FCA) includes identification of the scope of testing, a test plan, customization of test cases, management of system configurations, test execution, and analysis of the test results. The FCA of the Unity 3.2.1.0 shall include an EAC review of the Unity v.4.0.0.0 testing performed by SysTest on the M100 to:
- The requirements of Voting System Standards 2002;
- The Unity v.4.0.0.0 specifications of the ES&S TDP; and
- The voting system requirements of section 301 of the Help American Vote Act (HAVA).
iBeta shall identify the scope of the Unity 3.2.1.0 volume, stress, error recovery, security testing and a single end-to-end system level functional test. Discrepancies transferred from Unity 4.0.0.0 or 3.2.0.0 shall be incorporated into appropriate test cases. We shall develop a test plan; customize test cases; manage the system configurations; execute tests, and analyze the test results.

Information regarding test responsibilities is identified in the Sequence of Certification Test.

This test plan contains:
- The voting system and the scope of certification testing;
- The pre-certification test approach and methods;
- The certification test hardware, software, references and other materials for testing;
- The certification test approach and methods;
- The certification test tasks and prerequisite tasks; and
- The certification resource requirements.

1.1 References

The documents listed below are used in the Unity 3.2.1.0 certification test effort. Documents relevant to the unmodified EAC certified Unity 3.2.0.0 voting system are found in the Unity 3.2.0.0 Test Report

1.1.1 Internal Documentation

The documents identified below are iBeta internal documents used in Unity 3.2.1.0 certification testing

Table 1 Internal Documents

Version #	Title	Abbv	Date	Author (Org.)
iBeta	& ES&S Contract Documents			
v.07	Voting Certification Master Services Agreement- Election Systems & Software	MSA contract	11/15/08	iBeta Quality Assurance
Rev 01	Statement of Work No. 03 Maximum Reuse Project Estimate	SOW 3-01		iBeta Quality Assurance
Rev 01	Statement of Work No. 04	SOW 4-01		iBeta Quality Assurance
iBeta	VSTL Procedures			
v.2.1	Voting Deliverable Receipt Procedure		9/19/08	iBeta Quality Assurance
v.2.0	PCA Document Review Procedure		2/4/08	iBeta Quality Assurance
v.2.0	PCA Source Code Review Procedure		4/21/09	iBeta Quality Assurance
v.5.0	C and C++ Review Criteria		4/21/09	iBeta Quality Assurance
v.0.2	COBOL Review Criteria		4/21/09	iBeta Quality Assurance
v.1.0	Witness Build Procedure		4/18/08	iBeta Quality Assurance
v.2.0	Trusted Build Procedure		1/23/09	iBeta Quality Assurance
v.4.1	Test Case Preparation & Execution Procedure		4/7/09	iBeta Quality Assurance
v.5.2	Project Management Voting Procedure		8/5/09	iBeta Quality Assurance
v.4.0	VSTL Test Planning Procedure		5/23/08	iBeta Quality Assurance
v.4.0	VSTL Certification Report Procedure		4/24/09	iBeta Quality Assurance
iBeta	Unity 3.2.1.0 Testing			
	ESS Source Code Review Assessment Letter	3% Source Code Review Assessment	8/13/09	iBeta Quality Assurance
	Unity 3.2.1.0 PCA Document Review	PCA Document Review	9/16/09	iBeta Quality Assurance
	ESS Unity 3.2.1.0 Code & Equipment Receipt		9/17/09	iBeta Quality Assurance
	Test Methods Unity 3.2.1.0		9/17/09	iBeta Quality Assurance
	Reuse Environmental Test Case -Unity 3.2.1.0		8/25/09	iBeta Quality Assurance
	Reuse Characteristics Test Case -Unity 3.2.1.0		8/4/09	iBeta Quality Assurance
	FCA Security Review Unity 3.2.1.0		9/4/09	iBeta Quality Assurance
	FCA Security Test - Unity 3.2.1.0 Windows Configuration Test steps		9/16/09	iBeta Quality Assurance
	FCA Test Documents Review Unity 3.2.1.0		8/4/09	iBeta Quality Assurance
	FCA Volume 1		9/4/09	iBeta Quality Assurance
	FCA Volume 2		9/4/09	iBeta Quality Assurance
	FCA Volume 4		8/27/09	iBeta Quality Assurance
	FCA Volume 5		8/26/09	iBeta Quality Assurance
	FCA Volume 11		9/16/09	iBeta Quality Assurance
	FCA Volume 12		9/17/09	iBeta Quality Assurance
	EAC Clearing House Catalog		9/2/09	iBeta Quality Assurance
	Validated Test Tools		7/8/09	IBeta Quality Assurance
	ES&S Unity 3.2.1.0 EAC Matrix		pending	iBeta Quality Assurance
iBeta	ECO Assessments DS200 Ballot Box			
	Assessment ECO000315 Add Glue to BOM		8/12/09	iBeta Quality Assurance

Version #	Title	Abbv	Date	Author (Org.)
	Assessment ECO000332 New lock		8/12/09	iBeta Quality Assurance
	Assessment ECO000337 Status Change		9/18/09	iBeta Quality Assurance
	Assessment ECO000339 Add washer to lid		8/12/09	iBeta Quality Assurance
	Assessment ECO 000340 Drawings to Rev A		8/19/09	iBeta Quality Assurance
	Assessment ECO000342 Ballot Box Retrofit Change to Engineering Status (process)		8/11/09	iBeta Quality Assurance
	Assessment ECO000359 Ballot Box Bottom Metal Edge		9/18/09	IBeta Quality Assurance
Rev 1	Assessment ECO 000366 Drawing Ballot Box Retrofit		8/20/09	iBeta Quality Assurance
	Assessment ECO000375 Drawing Carry Case		9/18/09	iBeta Quality Assurance
	Assessment ECO000423 Ballot Box Shipping Configuration		8/21/09	iBeta Quality Assurance
iBeta	ECO Assessments DS200 Other			
	Assessment ECO 839 (DS200 CF label)		8/20/09	iBeta Quality Assurance
Unity	v.4.0.0.0 Reuse Correspondence			
	ESS Unity 3.2.1.0 Source Code Reuse Recommendation*		8/13/09	EAC
Reused	EAC Certification # ESSUnity3200			
v.4.0	Election Systems & Software Unity 3.2.0.0 Voting System VSTL Certification Test Report (V)2009-30Jun-001(D) *	Unity 3.2.0.0 Test Report	7/22/09	iBeta Quality Assurance
	FCA Volume 3		6/3/09	iBeta Quality Assurance
	FCA Volume 6		6/17/09	iBeta Quality Assurance
	FCA Volume 7		6/17/09	iBeta Quality Assurance
	FCA Volume 8		6/17/09	iBeta Quality Assurance
	FCA Volume 9		6/29/09	iBeta Quality Assurance
	FCA Volume 10		5/12/09	iBeta Quality Assurance
	FCA Security Review Unity 3.2		6/23/09	iBeta Quality Assurance
	FCA Security Test - Unity 3.2 Windows Configuration Test steps		6/3/09	iBeta Quality Assurance
	Regression System Level TC		6/17/09	iBeta Quality Assurance

* **Public document found on the EAC website**

1.1.2 External Documentation

The documents identified below include general external resources used in all certification testing. ES&S and EAC correspondence relevant to the Unity 3.2.1.0 test effort is listed. SysTest Unity 4.0.0.0 test documents are included only if they are relevant to the Unity 3.2.1.0 test effort.

Table 2 External Documents

Version #	Title	Abbv	Date	Author (Org.)
	Help America Vote Act*	HAVA	10/29/02	107th Congress
NIST Handbook 150 2006 Edition	NVLAP Voting System Testing	NIST 150	Feb.2006	National Voluntary Lab Accreditation Program
NIST Handbook 150-22	NVLAP Voting System Testing	NIST 150-22	Dec. 2005	National Voluntary Lab Accreditation Program
	Federal Election Commission Voting System Standards	VSS	April 2002	Federal Election Commission
	Testing and Certification Program Manual*	Certification Program Manual	1/1/07	EAC
v.1.0	Voting System Test Laboratory Program Manual*	VSTL Program Manual	July 2008	EAC
v.5.2	EAC Test Matrix template*			EAC
	EAC Decision on Request for Interpretation 2007-02, 2002 Voting Systems Standards, Vol. 1, Section 4.2.5*	Interpretation 2007-02	5/14/07	EAC

Version #	Title	Abbv	Date	Author (Org.)
	EAC Decision on Request for Interpretation 2007-04, 2005 VVSG Vol. 1 Section 3.1.3*	Interpretation 2007-04	10/29/07	EAC
	EAC Decision on Request for Interpretation 2007-05, 2005 VVSG Vol. 1 Section 4.2.1 (Testing Focus and Applicability) *	Interpretation 2007-05	11/6/07	EAC
	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) *	Interpretation 2007-06	11/7/07	EAC
	EAC Decision on Request for Interpretation 2008-01, 2002 VSS Vol. II, 2005 VVSG Vol. II, Section 4.7.1 & Appendix C*	Interpretation 2008-01	2/6/08	EAC
	EAC Decision on Request for Interpretation 2008-02, Battery Backup for Optical Scan Voting machines*	Interpretation 2008-02	2/19/08	EAC
	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*	Interpretation 2008-03	10/3/08	EAC
	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*	Interpretation 2008-04	5/19/08	EAC
	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*	Interpretation 2008-05	5/19/08	EAC
	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) *	Interpretation 2008-06	8/29/08	EAC
	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*	Interpretation 2008-07	8/27/08	EAC
	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*	Interpretation 2008-09	8/25/08	EAC
	EAC Decision on Request for Interpretation 2008-10 (Electrical Fast Transient) 2005 VVSG Vol. I, Section 4.1.2.6 2005 VVSG Vol. II, Section 4.8*	Interpretation 2008-10	8/28/08	EAC
	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*	Interpretation 2008-12	12/19/08	EAC
	Notice of Clarification NOC 07-001: Timely Submission of Certification Application*	NOC 07-001	7/17/07	EAC
	Notice of Clarification NOC 07-002: VSTL Work with Manufacturers Outside of Voting System Certification Engagements*	NOC 07-002	7/24/07	EAC
	Notice of Clarification: NOC 07-003: State Testing Done in Conjunction with Federal Testing within the EAC Program*	NOC 07-003	8/06/08	EAC
	Notice of Clarification: NOC 07-004: Voting System Manufacturing Facilities*	NOC 07-004	9/05/07	EAC

Version #	Title	Abbv	Date	Author (Org.)
	Notice of Clarification 07-05: Voting System Test Laboratory (VSTL) responsibilities in the management and oversight of third party testing*	NOC 07-005	9/07/07	EAC
	Notice of Clarification NOC 08-001: Validity of Prior Non-Core Hardware Environmental and EMC Testing*	NOC 08-001	3/26/08	EAC
	Notice of Clarification: NOC 08-002: Clarification of EAC Mark of Certification Requirement*	NOC 08-002	8/30/08	EAC
	Notice of Clarification NOC 08-003: Clarification of EAC Conformance Testing Requirements for VSTLs*	NOC 08-003	7/30/08	EAC
	Notice of Clarification: NOC 09-001 Clarification of the Requirements for Voting System Test Laboratories (VSTLs) Development and Submission of Test Plans*	NOC 09-001	5/1/09	EAC
	Notice of Clarification: NOC 09-002: Clarification of EAC Laboratory Independence Requirement*	NOC 09-002	5/4/09	EAC
Unity 3.2.1.0 EAC Correspondence				
	2002 VSS Supported Functionality Declaration		8/11/09	ES&S
	Unity 3.2.1.0 Application Letter		7/20/09	ES&S
	Unity 3.2.1.0 Application		8/11/09	ES&S
	Unity 3.2.1.0 Modules		No date	ES&S
Unity v.4.0.0.0 Reuse Correspondence				
	8 04 09 ltr to ESS reuse of testing final*		8/4/09	EAC
	9 11 09 Approval Source Code Final*		9/11/09	EAC
Unity v.4.0.0.0 Test Documents				
Rev.10.0	ES&S Unity 4.0 Certification Test Plan Document Number 07-V-ESS-035-CTP-01		12/9/08	SysTest
Rev.0.2	Voting System Test Summary Report, Test Report for testing through 10/22/08 for ES&S Unity 4.0 Voting System, Report Number 01-V-ESS-035-CTP-01		12/19/08	SysTest
Rev.0.3	Election Assistance Commission Voting System Test Summary Report Summary of test Report for testing through 10/22/08 for Election Systems & Software (ES&S), Unity 4.0 Voting System Report Number 07-V-ESS-035-CTP-01	Summary Report of Unity 4.0	7/14/09	EAC
	Unity 4.0 Disc Rpt 10-28-08		10/28/08	SysTest
	ESS M100 Electrical Supply Rev 01 TE01		7/11/09	SysTest
	EMC Qualification Test Report Election Systems and Software Voting System, M100 Test Report Number 060530-1050		6/29/06	Criterion Technology Inc.
	Advanced Product Testing Lab Testing Services Report APT Job Number: 06-00329		7/21/06	Sun Microsystems Advance Product Testing Lab
	Certificate of Compliance Certificate Number : #SS-0806-R06-COC		7/29/08	Compliance Integrity Services
	Engineering Change Evaluation & Review ECO 682		6/28/06	SysTest

* Public document found on the EAC website

1.1.3 Technical Data Package Documents

The modifications to the Technical Data Package Documents submitted for the Unity 3.2.1.0 certification test effort are listed below. The unmodified documents from the EAC certified Unity 3.2.0.0 voting system are contained in the Unity 3.2.0.0 test report.

Table 3 Unity 3.2.1.0 Modifications Technical Data Package Documents

Title	Version	Date	Author
Unity 3.2.1.0 (Modifications to the ESSUnity3200)			
Election Systems & Software System Overview Unity v. 3.2.1.0	3.0	08/11/09	ESS
2002 VSS Supported Functionality Declaration	None	08/11/09	ESS
Election Systems & Software System Limitations Unity v. 3.2.1.0	4.0	08/18/09	ESS
Unity 3.2.1.0 System Change Notes	1.0	No Date	ESS
Election Systems & Software Technical Documentation Package	None	Aug 2009	ESS
Technical Documentation Package	None	No Date	ESS
ES&S TDP Organization and Abstract	1.0	No Date	ESS
Requirements of the 2005 VVSG Trace to Vendor Testing and Technical Data Package	None	08/11/09	ESS
ES&S Software Design Specifications Model 100 Unity v. 3.2.1.0	4.0	09/02/09	ESS
ES&S System Functionality Description Model 100 Unity v. 3.2.1.0	3.0	08/11/09	ESS
ES&S System Hardware Specification Model 100 Unity v. 3.2.1.0	4.0	09/02/09	ESS
ES&S Inc. INDENTED BILL OF MATERIAL	None	05/15/08	ESS
ES&S M100 System Maintenance Manual Firmware Version 5.4.0.0 Hardware Version 1.3	None	08/11/09	ESS
ES&S Model 100 System Operations Procedures Firmware Version 5.4.0.0 Hardware revision 1.3	None	08/28/09	ESS
ES&S System Security Specification Version Release 3.2.1.0	None	08/28/09	ESS
Election Systems & Software Model 100 Validation Guide	2.0	08/18/09	ESS
Engineering Programmer Quick Start Guide	None	No Date	BPM Microsystems, L.P.
Hardening Procedures for the Election Management System PC	None	09/08/09	ESS
Model 100 Test Case Specification Firmware Version 5.4.0.0 Hardware Version 1.3 Test Case 1.0	None	11/15/07	ESS
Combining M100 and iVotronic Results at the Precinct Handout	None	07/31/09	ESS
Model 100 Election Day Checklist Version Number 5.4.0.0	None	07/31/09	ESS
Model 100 Pre-Election Day Checklist Version Number 5.4.0.0	None	07/31/09	ESS
U3210 Physical Configuration Diagram	None	No date	ESS
Build Documents for Modifications in Unity 3.2.1.0			
How to Create Firmware Update Media for the Model 100	None	05/07/07	ESS
Build Procedure Model 100 Precinct Tabulator Firmware Version 5.4.1.0	1.1	09/01/2009	ESS
Installation Guide QNX Software Systems, Ltd. QNX 4.22A Product Suite	1.0	08/14/09	ESS
Build Procedure Unity 3.2.1.0 Unity Software Applications	1.1	09/01/2009	ESS
Engineering Change Orders for - Unity 3.2.1.0			
ECO 839	None	07/28/09	Ricoh Electronics
Normal & DMR ECO ECO-000315 [M200-Release drawing, 1st MP and change to ES2]	None	04/16/09	Pivot International
Normal & DMR ECO ECO-000332 [M200 - Update drawings]	None	05/04/2009	Pivot International
Normal & DMR ECO ECO-000337 [Release New Bill of Material and change Lifecycle Phase	None	05/05/09	Pivot International
Normal & DMR ECO ECO-000339 [M200 - Update BOM and drawing; release new drawings, add MPs, change to ES1	None	05/06/09	Pivot International
Normal & DMR ECO ECO-000340- DS200	None	05/07/09	Pivot International
Normal & DMR ECO ECO-000342 [M200 (ES1 Prototype Released).]	None	05/08/2009	Pivot International
Normal & DMR ECO ECO-000359 M200 - Release new Bill Of Materials	None	06/01/09	Pivot International
Normal & DMR ECO ECO-000366 M200 - Release drawing-change lifecycle	None	06/04/09	Pivot International
Normal & DMR ECO ECO-000375 M200 - Release drawing-change lifecycle	None	06/17/09	Pivot International
Normal & DMR ECO ECO-000423 [M200 - Replace packaging, reduce stack quantity]	None	07/19/09	Pivot International
Unity 4.0 Testing - M100			
ECO 682 Steward 28A0393-0A0 (image)	None	06/14/06	ESS
ECO 682 Braid (image)	None	06/14/06	ESS
ECO 682 Steward 28A350-0B2 (image)	None	06/14/06	ESS

Title	Version	Date	Author
ECO 682 Steward 28S0670-000 flat ribbon ferrite (image)	None	06/14/06	ESS
ECO 682 (M100)	None	06/19/06	ESS

1.2 Terms and Definitions

The Terms and Definitions identified below are used in this test report.

Table 4 Terms and Definitions

Term	Abbreviation	Definition
Absentee Ballot		A paper ballot cast outside of an early voting center or election day polling place
Adobe Acrobat Standard v.8 & v.9		COTS software used in ESSIM for creation of Portable Document Format (PDF) ballot files.
Audit Manager	AM	A Unity election management system audit logging software application for the Election Data Manager and Ballot Image Manager
Ballot Control - Accepts		HPM option that instructs the DS200 to accept and tabulate overvoted, blank, primary crossovers or ballots with unreadable marks without alerting the voter.
Ballot Control- Query		HPM option that instructs the DS200 to return and query the voter when encountering an overvoted, blank, primary crossovers or ballots with unreadable marks. Voter has the option to request a new ballot or instruct he system to accept the ballot as is.
Ballot Control - Reject		HPM option that instructs the DS200 to automatically reject crossover, overvoted or blank ballots. Ballots will not be accepted.
Ballot Marking Device	BMD	A device that marks a paper ballot for a voter
Ballot On Demand	BOD	An optional operating mode in ESSIM that is used to print a small quantity of election quality ES&S paper ballots on a COTS OKI 9600 HDN color laser printer.
Certified Information System Security Profession	CISSP	A certification for information system security practitioners, indicating successful completion of the CISSP examination administered by the International Information Systems Security Certification Consortium
Central counter		A type of voting system that records and reports paper ballots at the central count
Double Spit and Wipe		Functionality on the VAT to support older ES&S optical and digital scanners outside the scope of Unity 3.2.0.0
Early voting mode -		A mode on the DS200 that permits ballots to be cast prior to election day. A flag is set in HPM to include all precincts for the election. The poll-worker can select a voter's precinct and ballot style when used in Early Voting or an Absentee configuration.
Election Data Manager	EDM	A Unity election management system software application to define and store jurisdiction election data
Election Systems and Software	ES&S	Manufacturer of the Unity Voting System
Election management system	EMS	The ballot preparation and central count portions of a voting system.
Election Reporting Manager	ERM	A Unity central count software application to compile and report election results from Unity voting devices
Enhanced AutoCast		Functionality for automatically dropping AutoMARK ballots into a ballot box. This functionality requires PEB FW v.1.70 and Auto MARK FW v.1.4. That version of AutoMARK firmware is not supported in Unity 3.2.0.0
Escrow Agency		EAC identified repository that retains the file signature of the trusted build
ES&S AutoMARK Information Management System	AIMS	A windows-based election management system software application to define election parameters for the VAT, including functionality to import election definition files produced by the Unity EMS and create VAT flash memory cards
ES&S Ballot Image Manager	ESSIM	A Unity election management system desktop

Term	Abbreviation	Definition
		publishing tool to layout and format paper ballots
Executable Lines of Code	eLOC	Lines of code that execute functionality. Comments and blank lines are excluded from counts of executable lines of code.
Flash Memory Card	FMC	Portable memory that contains the election definition to display the ballot content on a VAT.
Full or New Code Review		First time submission submitted for certification review or previously certified code with changes to the code so significant that a full review is warranted.
Graphical User Interface	GUI	A method of interaction with a computer which uses pictorial buttons (icons) and command lists controlled by a mouse
Hardware Programming Manager	HPM	A Unity election management system software application to import, format, and convert an election file and create election definitions for ballot scanning equipment
Help America Vote Act	HAVA	Legislation enacted in 2002 which includes creation of the EAC, federal voting standards and accreditation of test labs
intElect DS200	DS200	A Unity Voting System precinct count digital scanner paper ballot tabulator including a 12-inch touch screen display providing clear voter feedback and poll worker messaging.
Model 100	M100	A Unity Voting System precinct-based, voter-activated paper ballot counter and vote tabulator.
Model 650	M650	A Unity Voting System central count high-speed optical scanner paper ballot tabulator The M650 prints results reports to an external printer and saves results to a zip disk.
National Standard Reference Library	NSRL	Part of NIST that provides software escrow.
National Voluntary Laboratory Accreditation Program	NVLAP	Part of NIST that provides third-party accreditation to testing and calibration laboratories.
Open Primary Pick a Party (Party Preference)		Ballot contains all contests that the voter is eligible to vote for in addition to any nonpartisan contests. Voter only votes the partisan contests for one party but chooses which party in the privacy of the voting booth by only voting for candidates from the desired party. Pick a Party is where a party selection contest appears before the partisan section of the ballot. If the voter chooses a party from the party selection contest, votes for candidates that represent any other party are ignored so that the voter cannot spoil the ballot.
Precinct counter		A type of voting system that records paper or electronic ballots at the polling place
Printer Engine Board version	PEB v.	The version of the firmware on the Printer Engine Board identifies support or non-support of Enhanced AutoCast and Double Spit & Wipe (v.1.70 supports)
Single Board Computer version	SBC v.	Version of the Single Board Computer identifying board connections and chips
Trusted Build		A compile and build of the source code reviewed by iBeta into executable code. Construction of the build platform and compile is performed by iBeta following the documented instructions of the manufacturer. A manufacturer's representative is present to witness the build.
Technical Data Package	TDP	The documentation and code relating to the voting system, submitted by the manufacturer for review.
Universal Power Supply	UPS	Uninterrupted power supply
U.S. Election Assistance Commission	EAC	U.S. agency established by the Help America Vote Act of 2002 to administer Federal elections.
Voluntary Voting System Guidelines	VVSG	Federal voting system test standards created by the EAC. Eventually these will replace the VSS.
Voting System Standards	VSS	Federal voting system test standards, predecessor of

Term	Abbreviation	Definition
		the VVSG.
Voting System Test Lab	VSTL	Lab accredited by the EAC to perform certification testing of voting systems.
Voting Variations		Significant variations among state election laws incorporating permissible ballot content, voting options and associated ballot counting logic
Voter Assist Terminal	VAT	A ballot marking device to assist multilingual voters and voters with visual, aural or dexterity disabilities to vote a paper ballots in a private manner
Unity x.x.x.x		A voting system produced by ES&S configured with various election software applications, DREs, optical and digital scanners and ballot marking devices. The configuration varies for each version of Unity.
Witness Build for Unity 3.2.0.0		The Unity 4.0.0.0 Trusted Build performed by SysTest. iBeta shall initiate testing with this build. Following iBeta's performance of the Trusted Build a regression test will be run.

1.3 Testing Responsibilities

1.3.1 Project Schedule

The VSS 2002 identifies that there is no prescribed sequence for the testing of a voting system (Vol.1 Sect 9.4.2). The only sequence requirement is that predecessor tasks are completed prior to initiation of a task. Three entities influence the certification testing of voting systems, the manufacturer, the VSTL and the EAC. The schedule defined by iBeta details the tasks, dependencies, personnel and test phase. As the schedule for testing is dependent upon the level of system development, comprehensiveness of the TDP, demonstration of compliance of the voting system, and EAC approvals identification of schedule dates in the test plan is immediately obsolete. iBeta provides project time lines to the EAC and manufacturers throughout the test project. The Certification test tasks identified below are the critical path for completion of the certification test effort.

1.3.1.1   Owner Assignments

Staff assigned to the Unity 3.2.1.0 certification includes:
- Project Manager: Carolyn Coggins
- Lead Tester/Reviewer: Gail Audette, Carolyn Coggins, Jennifer Garcia, and Kevin Wilson
- Tester/Reviewers: Stephanie Eaton, Sridevi Jakileti, Saeng Sivixay, and Michael Warner.
- Owner Assignments are identified in Table 5. Owners identified as TBD will be determined during the certification test effort and updated in the as run Test Plan submitted with the Test Report.

1.3.1.2   Test Case Development

Test methods identified in section 7 provide an outline of the content of the test cases. Test method and test case development are incorporated into Table 5.

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

Description of the reuse of third party tests is included in sections 1.0, 2.1.4, 4.4.1, 4.4.2 and 7.2 and incorporated into Table 5.

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
Identify scope of project for contract negotiation	Determination of voting system change status; EAC approval of the ES&S application changes	Coggins, Garcia	Complete
Set up Project Repositories	Contract Authority	Coggins	Complete
Reporting of Discrepancies	Commencement of the project	All staff	Aug to Nov
PCA TDP Document Review	Project repository and TDP Documents received with the changes in Unity 3.2.1.0	Eaton, Jakileti, Sivixay & Warner	Complete
PCA TDP 3% Source Code Assessment for Reuse	Project repository and TDP Documents & Source Code received, EAC determination regarding reuse	Jakileti, Warner	Complete
Determination for reuse of SysTest Lab Unity 4.0 testing of FCA Functional, Accuracy, Maintenance, Availability, Accessibility& Usability Test Case	Review of the SysTest Unity 4.0 test record	EAC Reviewers	Aug/Sept
FCA Testing Review and Test Scope/ Requirements Identified; development of test methods	TDP & Test Documents received for the changes in Unity 3.2.1.0; receipt of the list of the SysTest M100 discrepancies; and determination of reuse from SysTest Unity 4.0 test effort	Garcia, Eaton, Wilson, Jakileti, Warner	Aug/Sep
Certification Test Plan	EAC determination of reuse; Preliminary PCA TDP Document Review, FCA Testing Review	All staff	Aug/Sept
FCA Test Case preparation	TDP Documentation received, FCA Testing Review, Identification of Test Scope and Requirements	Garcia, Eaton, Wilson, Jakileti, Sixivay, Warner	Aug/Sept
PCA System Configuration	All deliveries of the TDP Documentation, hardware and software received	Eaton, Sixivay	Aug to Nov
Trusted Build	PCA Source Code Review; validate COTS, review and validation of installation procedure including user selections and configuration changes	Jakileti, Warner	Sept
Test tool validation	Identification of tools; verify validations performed on earlier projects for standard tools	Audette, Jakileti & Wilson	Complete
Test Method validation	Completion of test method, Dry run M100 operational status check,	Coggins, Garcia, Eaton & Warner	Aug/Sept.
FCA Environmental Hardware Test Case Execution	EAC authorization for reuse of SysTest Environmental HW test; review of reused reports; identification of HW scope FCA Environmental Test Case preparation, operational status check developed, & PCA System Configuration; assessment of any submitted ECOs, delivery of hardware; sub-contractor selection; quotations and purchase order issuance	Coggins, Garcia, Eaton	Sept/Oct
FCA Security Review & Testing	Receipt of updated security documents, review and assessment of EAC Clearing House threats, preparation of the FCA Security Document Review, Test Method, and Security Test Case preparation, Trusted Build completed	Garcia, Jakileti, Wilson	Aug/Sept/Oct
FCA Telephony and Cryptography Review and Test	Verification of modem removal from the M100	Garcia, Jakileti, Wilson	Sept
FCA Regression Test Execution	FCA Regression Test Method and Test Case completed; PCA System Configuration verified; and Trusted Build completed	Coggins, Garcia, Eaton & Warner	Sept
FCA Volume Test Execution	FCA Volume Test Method and Test Case completed; PCA System Configuration verified; and Trusted Build completed	Garcia, Eaton, Jakileti, Sixivay, Warner	Sept
VSTL Certification Report	Successfully complete all FCA and PCA tasks	All staff	Oct/Nov
Deliver the Certification Report for EAC Review	Completion of VSTL Certification Report	Coggins, Eaton, Garcia, Sixivay, Warner	Oct/Nov
Delivery of the ES&S letter signed by iBeta; trusted build, hash & images	Initial Decision issued by the EAC	Coggins, Garcia, Eaton, Jakileti, Sixivay, Warner	Nov

Certification Test Task	Predecessor Tasks or Dependencies	Owner	Phase
Re-issue the Certification Report with the EAC Certification Number	Certification number issued by the EAC	Coggins	Nov

1.4 Target of Evaluation Description

1.4.1 System Overview

Unity 3.2.1.0 incorporates all functionality of the EAC Certified ESSUnity3200 (Unity 3.2.0.0 Voting System) with the addition of the Model 100 precinct counter optical scanner and an EMS Local Area Network Configuration.

1.4.1.1   Overview of the Unchanged Portions from Unity 3.2.0.0

The overview of the Certified ESSUnity3200 (Unity 3.2.0.0 Voting System) is found in section 4 Voting System Overview of the *Election Systems & Software Unity 3.2.0.0 Voting System VSTL Certification Test Report v.4.0.*

1.4.1.2   Overview of the Changes Submitted in Unity 3.2.1.0

Model 100 Precinct Count Optical Scanner (M100)

The Model 100 is a precinct-based, voter-activated paper ballot counter and vote tabulator. The Model 100 uses advanced Intelligent Mark Recognition (IMR) visible light scanning technology, proven to be accurate and secure. In special cases, the Model 100 may serve as a central tabulator for jurisdictions with a very small installed voter base and fewer than 30 political subdivisions (precincts).

The Model 100 submitted for testing in Unity 3.2.1.0:

- Reads marks on both one and two-sided ballots;
- Can generate reports and store election results from paper reports produced from:
    - The tabulator's internal, thermal printer
    - An external printer connected to the tabulator;
- Transfer report and election results to Election Reporting Manager via a removable PCMCIA card
- Uses PCMCIA cards to store the tabulator's election definition, audit log and other election-specific information;
- Has an LCD screen that controls all tabulator functions and four message areas that identify:
    - The current menu
    - The status of the tabulator,
    - The battery status, and
    - The available menu options;
- Feeds scanned ballots directly into the ballot box, which sorts the ballots according to criteria programmed in the election definition with an internal diverter;
- Uses a 12-volt, 7-amp lead acid battery to power the tabulator to ensure that tabulator operations continue without interruption in case of an electrical power failure;
- Multi-sheet sensor prevents multiple ballots from passing through the tabulator's read area at the same time;;
- Contains an internal back-up battery that can run the tabulator for one to three hours if a power outage were to occur, depending on tabulator activity;
- Accepts ballots inserted in any orientation – top first, face up; bottom first, face down; etc;
- Alerts and returns the ballot to the voter to permit the voter to revise and recast overvoted races, undervoted races, or blank ballots;
- Is designed with physical security features and maintains a real time audit log of all transactions;
- Is driven by an Intel processor and employs the real-time QNX operating system software;
- Holds up to 2800 paper ballots; and
- Can process ballots for up to 18 precincts on Election Day.

The Model 100 submitted for testing in Unity 3.2.1.0 has had the modems removed for this certification effort. All M100 functions for supporting modems and data transferred by modem directly from the tabulator to the central count location are out of scope.

EMS LAN Configuration
Local networking of Election Management System workstations and reporting workstations is supported in two configurations:
- Windows XP peer-to-peer includes the AIMS PC, one or more Unity PC(EDM, ESSIM, ERM, Audit Manager, HPM and LogMonitor) and one or Unity ERM PC
- Windows 2003 Server includes the server, AIMS PC, one or more Unity PC(EDM, ESSIM, ERM, Audit Manager, ,HPM and LogMonitor) and one or more Unity ERM PC.

1.4.2 Block Diagram

Election Coding Center -- Standalone

HARDENED EMS WORKSTATION
Audit Manager
Log Monitor
Election Data Manager
Ballot Image Manager
AIMS
See SOPs for system requirements

Ballot Production

Third Party Printer
or ES&S Print Services

Election Central Central/Absentee Ballot Tabulation

Paper Ballots

Election Definition

Election Coding Center Results Consolidation and Reporting

***Can be the same PC running EMS applications in the networked or stand-alone coding center

Results Projector

RESULTS DISPLAY WORKSTATION
Election Reporting Manager
See SOP for system requirements

Report Printer

Hub/Switch

HARDENED EMS WORKSTATION***
Election Reporting Manager
See SOP for system requirements

Results files to ERM

Output Files from ElectionWare

Election Coding Center – Closed Network

HARDENED EMS PC*
Audit Manager
Log Monitor
Election Data Manager
Ballot Image Manager
AIMS
See SOPs for system requirements

Election Definition File Server

Hub/Switch

Networked Report Printer

HARDENED EMS PC*
Audit Manager
Log Monitor
Election Data Manager
Ballot Image Manager
AIMS
See SOPs for system requirements

HARDENED EMS PC*
Audit Manager
Log Monitor
Election Data Manager
Ballot Image Manager
AIMS
See SOPs for system requirements

*Quantities determined by Jurisdiction

Output Files from Unity EMS

Election Coding Center – Equipment Preparation

HARDENED EMS WORKSTATION**
Hardware Programming Manager
See SOP for system requirements

maxell zip

SanDisk 1.0 GB

BMW DEMO – ENG VER: 5.2.0.0

DS200 Election Definition

Model 100 Election Definition

**Can be the same PC running EMS applications in the networked or stand-alone coding center

Paper Ballots

Election Definition

Polling Place – Election Day/Early Voting

Marked Ballots

Marked Ballots

DS200 Election Definition

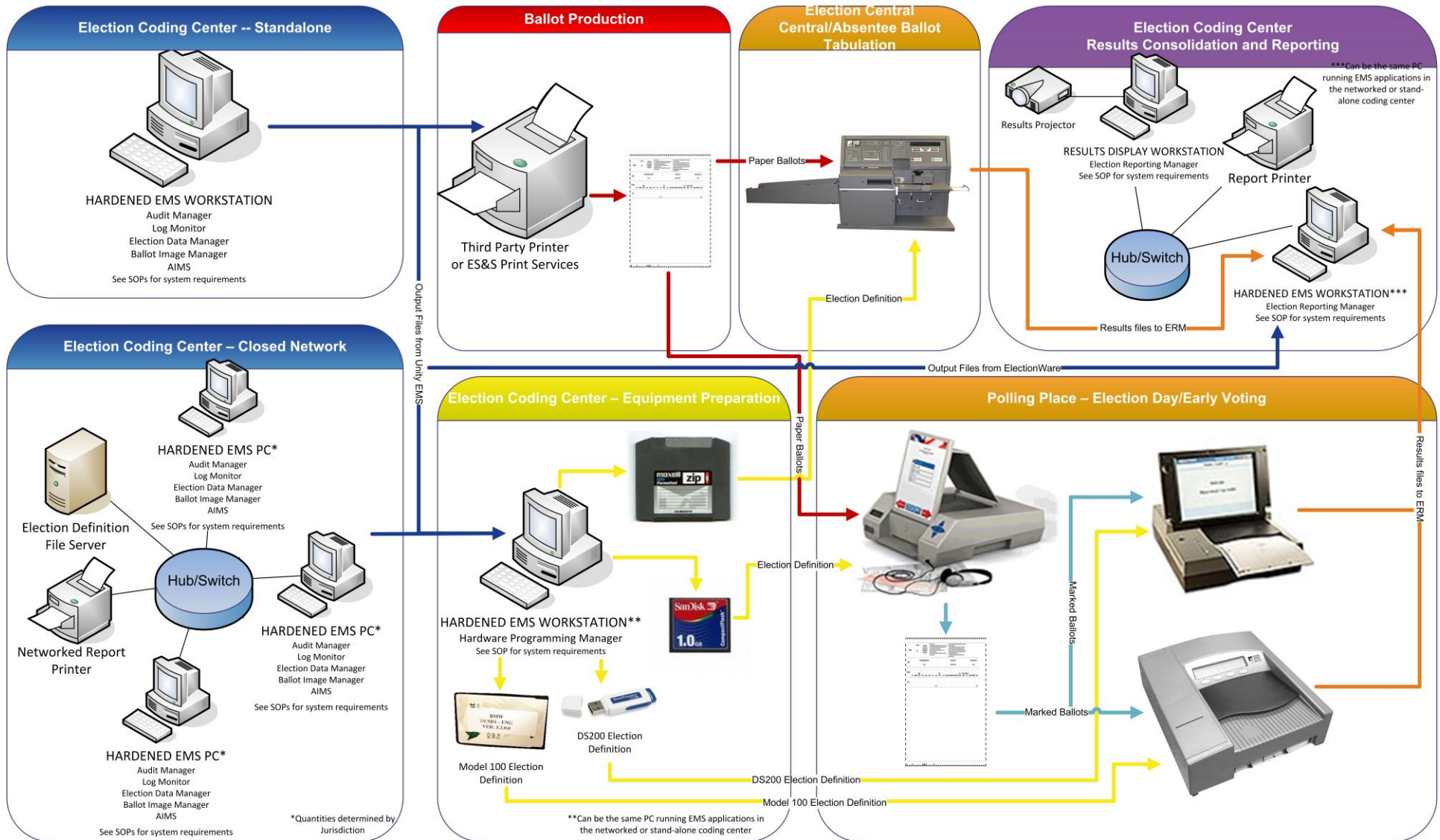Model 100 Election Definition

Results files to ERM

Diagram is provided by ES&S in their System Overview

1.4.3 System Limits

Limits that are dictated by the applications of the EMS of Unity 3.2.1.0 are identified as limits to the full system. Specific limits that apply to individual hardware are identified by product.

1.4.3.1 Limits to Full System

The following system limits and the applicable application:
- Maximum precincts allowed in an election 2900 HPM/ERM
- Maximum precincts allowed per polling place 2200 HPM
- Maximum Precincts included per poll (reporting limit) 1900 ERM
- Maximum contests allowed in an election Depends on election content 5200 theoretical maximum* ERM
- Maximum candidates/counters allowed per election (Software) 21,000 ERM
- Maximum candidate counters allowed per precinct 1000 ERM Import
- Maximum Candidates per polling place 1200 HPM
- Maximum ballot styles allowed per election 5000 HPM
- Maximum contests allowed per ballot style 1100 HPM
- Maximum precincts allowed per ballot style 1700 HPM
- Maximum candidates (ballot choices) allowed per contest 175 HPM
- Maximum count for any precinct element 999,000 ERM report (65,535 on any precinct results import)
- Maximum ballot styles allowed per precinct 5000 HPM
- Maximum ballot styles allowed per Election (coded by ballot style) 1639 HPM
- Maximum number of parties allowed 18 HPM
- Maximum 'vote for' per contest 90 HPM

*Note: The calculated "theoretical maximum" allowed number of contests is an estimate based on the system's 21,000 counter limit and recognition that the minimum number of counters allowed for any contest is four (the minimum number of overhead counters that must be associated with a contest (undervotes, overvotes and precincts counted) plus one candidate). The three overhead counter estimate assumes that no Absentee Precincts are defined in the election (An absentee precinct adds an "absentee precincts counted" overhead counter). Thus, the absolute maximum number of contests for an election can only be reached if all contests contain only one candidate and is calculated as follows: 21,000 (counter limit)/4 (3 overhead counters + 1 candidate per contest) = 5250 (rounded to 5200). A more realistic maximum, calculated for two candidates per contest, follows 21,000 (counter limit)/5 (3 overhead counters + 2 candidates per contest) = 4250

1.4.3.2 AutoMARK VAT Hardware Limits

The ES&S AutoMARK capacities exceed the documented limitations for the ES&S election management, vote tabulation and reporting system. For this reason, the full system limitations and ballot tabulator limitations define the practical system boundaries and capabilities of the AutoMARK system.

1.4.3.3 DS200 Hardware Limits

The following system limits of the DS200:
- Maximum precincts allowed per polling place: Election Day-10, Early Vote- All (1639 max)
- Maximum contests allowed in an election: Depends on Election Content (e.g. 5200 if 1 candidate per contest, 4250 if 2 candidates per contest, etc)
- Maximum candidates/counters allowed per election: 21,000
- Maximum candidate counters allowed per precinct: 1000 (ERM limitation)
- Maximum ballot styles allowed per election: 5000 or Paper Code **
- Maximum contests allowed per ballot style: 250 or # of positions on ballot
- Maximum candidates (ballot choices) allowed per contest: 175
- Maximum count for any precinct element: 65,500 (ERM limitation)
- Maximum ballot styles allowed per precinct: 40
- Maximum number of parties allowed: 18
- Maximum 'vote for' per contest: 90

**Note: 'Paper Code' refers to the paper ballot code channel, which is the series of black boxes that appear between the timing track and ballot contents. This code limits the number of available ballot variations depending on how a jurisdiction uses the paper code to differentiate ballots. The code can be used to differentiate ballots by Sequence (limited to 1-1639 variations), Type (1-30 variations) or Split (1-40 variations).

1.4.3.4 M100 Hardware Limits

The following system limits of the M100:
- Maximum precincts allowed per polling place: Election Day-18, Early Vote- 450
- Maximum contests allowed in an election: Depends on Election Content (e.g. 5200 if 1 candidate per contest, 4250 if 2 candidates per contest, etc)
- Maximum candidates/counters allowed per election: 21,000 (ERM Limitation)
- Maximum candidate counters allowed per precinct: 1000 (ERM Limitation)
- Maximum ballot styles allowed per election: Paper Code**
- Maximum contests allowed per ballot style: 200
- Maximum candidates (ballot choices) allowed per contest: 175
- Maximum count for any precinct element: 65,500 (ERM limitation)
- Maximum ballot styles allowed per precinct: 40 (per type if coded by Precinct ID)
- Maximum number of parties allowed: 18
- Maximum 'vote for' per contest: 90

1.4.3.5 M650 Hardware Limits

The following system limits of the M650:
- Maximum precincts allowed per polling place: 1639
- Maximum contests allowed in an election: Depends on Election Content (e.g. 5200 if 1 candidate per contest, 4250 if 2 candidates per contest, etc)
- Maximum candidates/counters allowed per election: 3750***
- Maximum candidate counters allowed per precinct: 1000 (ERM limitation)
- Maximum ballot styles allowed per election: N/A
- Maximum contests allowed per ballot style: # of positions on ballot
- Maximum candidates (ballot choices) allowed per contest: 175
- Maximum count for any precinct element: 65,500 (ERM limitation)
- Maximum ballot styles allowed per precinct: 1200 (Election Content), 100 in a single absentee precinct
- Maximum number of parties allowed: 18
- Maximum 'vote for' per contest: 90

***Note: The total number of counters included in an election is calculated by adding one overhead counter (OC) to the number of statistical counters configured in EDM (SC), plus the number of candidates (Ca) in each contest (Co), plus the overvote (Ov) and undervote (Uv) counters for every contest (Co) in the election. OC+SC+(Ca + Co)+((Ov+Uv) x Co) = Counters

1.4.4 Supported Languages

Unity 3.2.1.0 supports only English and Spanish ballot languages.

1.4.5 System Functionality

System functionality of the Unity 3.2.1.0 is identified in Appendix A. Appendix A identifies the unmodified requirements from the EAC certified Unity 3.2.0.0 and testing addressing the following changes:
- Inclusion of the M100 Precinct Count Scanner which supports the same functionality as the DS200; and
- Inclusion of the EMS configured in a peer-to-peer or client/server local area network.

1.4.6 VSS 2002 Requirements Included and Excluded from Unity 3.2.1.0

The included and excluded VSS 2002 Requirements are listed in Appendix A.
As identified in the VSS2002 vol.1 section 4.1.2, software is excluded if it:
- Provides no support of voting system capabilities;
- Cannot function while voting system functionality is enabled; and
- Procedures are provided that confirm software has been removed, disconnected or switched.

The following functions are excluded from Unity 3.2.1.0 voting system and are not tested in this certification effort.
- All Direct Recording Electronic (DRE) requirements. Unity 3.2.1.0 is a paper ballot system.
- Provisional ballots: The handling of provisional ballots is procedural. There is no provisional ballot functionality.
- Transmission via Public Telecommunications: There is no transmission via public telecommunications. The DS200 and M100 modem is removed from this certification.
- Use of Wireless Communications : There is no use of wireless communications
- Enhanced AutoCast: This AutoMARK functionality requires both PEB v.1.70 and Auto MARK FW v.1.4. That version of AutoMARK firmware is not supported in Unity 3.2.1.0

1.4.6.1   Unity v.4.0.0.0 Scope Excluded from Unity 3.2.1.0

The Unity 4.0.0.0 items identified as exclusions are not contained in the Unity 3.2.1.0 system submitted for Certification under EAC Application # ESS0703.
- Hardware including related software/firmware and peripherals: Automated Bar Code Reader (ABCR), iVotronic DRE Precinct Tabulator, the DS200 modem kit, the M100 configured with a modem and the M650 configured with a network card;
- EMS Software: Data Acquisition Manager and iVotronic Ballot Image Manager; and
- System functionality and maintenance: DRE, VVPAT
- Remote transmission of votes (via public telecommunications)
- Language accessibility other than English and Spanish.
- Blanket primary elections
- In the ESS Unity 3.2.0.0 certification the EAC granted permission for ES&S to reuse the Unity v.4.0.0.0 TDP if the documents bore a disclaimer outlining the uncertified functionality that was not part of the Unity 3.2.0.0 certification. As such the review of the document content related to the uncertified Unity v.4.0.0.0 functionality is excluded from review in Unity 3.2.1.0.

In receiving the source code, documents, hardware and test artifacts from SysTest, iBeta determined if the material was in or out of the Unity 3.2.1.0 test scope. Items determined to be out of scope were stored without further examination.

2 Pre-certification Tests

2.1 Pre-certification Test Activity & Test Results

The scope of the ES&S Unity 3.2.1.0 certification test effort resulted from a change to the EAC Certified Unity 3.2.0.0 voting system and the transfer of two EAC certification test efforts previously submitted for testing to SysTest. ES&S' petition for consideration of reuse of SysTest reviews and testing resulted in the identification of a unique set of pre-certification test activities. As noted in the section 1 Introduction responsibility for these activities was designated to either iBeta or the EAC.

- iBeta identified the changes to the Unity 3.2.0.0 voting system;
- iBeta conducted a review of the test documentation provided by ES&S and SysTest to assess the scope of testing for conformance to the 2002 VSS Environmental Hardware, Volume, Stress, Error Recovery, Telecommunication and Security requirements for the changes to the Unity 3.2.0.0 voting system;
- The EAC assessed the reuse of the Functional, Usability, Accessibility, Maintainability, Accuracy and Reliability testing for the changes to the Unity 3.2.0.0 voting system.

iBeta's evaluation of prior Non-VSTL and VSTL testing and test results is listed below.

2.1.1 FCA Document Review & Results

iBeta initiated an assessment to identify and separate 1)Unity v.4.0.0.0 hardware and software excluded from Unity 3.2.1.0, 2) SysTest test results petitioned for reuse by ES&S, and 3)items in scope of additional testing required in the Unity 3.2.1.0 certification test effort. Following the assessment a process for review was identified. This process and the results of the FCA Document Review are described below.

2.1.1.1 Identification of the Out of Scope Unity v.4.0.0.0 Hardware & Software

Unity v.4.0.0.0 hardware and software excluded from the application for Unity 3.2.1.0 filed with the EAC was identified as out of scope for Unity 3.2.1.0 certification. This included: iVotronic Ballot Image Manager (iVIM); Data Acquisition Manager (DAM); iVotronic DRE precinct tabulator including the associated peripherals; Automatic Bar Code Scanner (ABCR); and remote transmission of vote data and/or consolidated results data.

FCA Document Review Result: All documentation of testing and review for these Unity v.4.0.0.0 hardware and software was excluded from examination in Unity 3.2.1.0

2.1.1.2 Identification of Unity v.4.0.0.0 Hardware & Software Test Results Petitioned for Reuse

The components transferred for certification previously certified under Unity 3.2.0.0 are identified in section 1. The changes to Unity 3.2.0.0 that were transferred for certification under Unity 3.2.1.0 included:

- Addition of the Model 100 precinct count scanner (M100), HW v. 1.3.0, FW v. 5.4.0.0.
- ERM v.7.5.5.0 firmware change to address Issue #104 transferred from Unity 3.2.0.0 (ERM v.7.5.4.0)
- Functional changes for the addition of a peer-to-peer or client/server LAN to the EMS.

ES&S petitioned the EAC for reuse of the M100 Unity v.4.0.0.0 test results. SysTest documented these results and provided them in the *Election Assistance Commission Voting System Test Summary Report Summary of Test Report for testing through 10/22/08 for Election Systems & Software (ES&S), Unity 4.0 Voting System Report Number 07-V-ESS-035-CTP-01, Rev 0.3, July 15, 2009* . This report documented their certification processes and testing performed including: " documentation review of the Technical Data Package, source code review, and testing... executing functional test cases based on the project test requirements, system level tests prepared by SysTest and analysis of results." For the hardware and software identified above as in scope for Unity 3.2.1.0 iBeta reviewed the open discrepancies related to the M100 system functionality and system changes submitted during the Unity v.4.0.0.0 test effort. A comparison of the versions submitted in the SysTest report and those identified discrepancies

for Unity 3.2.1.0 was conducted to confirm if the versions being submitted for Unity 3.2.1.0 matched the versions that were tested in the Unity v.4.0.0.0 certification.

If the Unity version number of the submitted system changes was equal to or less than the version identified in the report it was excluded due to the petition for reuse of the SysTest results. If the open functional discrepancy was equal to the version or greater than the identified in the report it was included in the iBeta testing of Unity 3.2.1.0.

FCA Document Review Result: It was found that SysTest tested the versions identified in the System Changes. This resulted in the exclusion of the discrepancy 463 from the iBeta test scope. Functional issues encountered in the versions identified in the report. This resulted in the inclusion of 428 and 475 in the iBeta testing of Unity 3.2.1.0.

Table 6 Functional Issues Transferred from SysTest

#	Type	Location	Issue Description	Guideline
7	Func-tional Defect	Model 100 v.5.4.0.0	**From SysTest Unity 4.0 Testing - Disc: 428** M100 accepted fake ballots that were copied from un-voted original ballots on a laser color copier printer (XEROX WORKCENTRE 7665).	V1 : 6.1 Systems are: To protect the system from intentional manipulation and fraud, and from malicious mischief
9	Func-tional Defect	ERM v. 7.5.0.0 40HTEST 1 TC	**Issue 35 transferred from Unity 3.2.0.0** **From SysTest Unity 4.0 Testing - Disc: 475** Numbered Key - Districts report is showing two M650 groups and the iVo PEB group does not appear; however, the PEB totals match the totals appearing alongside the second M650 group totals (it appears that the 'label' is incorrect and should read 'IVO PEB'). I then went into add/change groups and switched the location of the M650 group and the M100 group, regenerated the report and we now show two M100 groups and again the iVo totals appeared under the second M100 group. It seems the report is mimicking the name in group three into group four, but applying the correct totals. Copies of the report and screen shot of the add/change groups faxed to vendor.	V1: 4.4.4.a, b Voting systems shall meet these reporting requirements by providing software capable of obtaining data concerning various aspects of vote counting and producing reports of them on a printer. At a minimum, vote tally data shall include: a. Number of ballots cast, using each ballot configuration, by tabulator, by precinct, and by political subdivision; b. Candidate and measure vote totals for each contest, by tabulator;

Table 7 Out of Scope & Non Issues

SysTest #	Assessment Finding	Disposition
23, 24, 26, 27, 43, 190, 191, 196, 198, 235, 238, 245, 284, 318, 348, 355, 359, 361, 369, 382, 388, 390, 401, 434, 437, 441, 442, 445, 446, 450, 451, 452, 458, 464, 466, 467, 468, 469, 474, 478, 483, 485, 486, 487, 488, 490, 491, 494, 548	**Excluded from Unity v.3.2.1.0:** **System Hardware** Automated Bar Code Reader iVotronic DRE Precinct Tabulator Voyager Hand Scanner (COTS) **System Software** Unity Data Acquisition Manager Unity iVotronic Ballot Image Manager **Uncertified System Features** Remote transmission of vote data and/or consolidated results data (via the public networks) Combined reports for M100 &iVotronic	Not reviewed, remains open in Unity v.4.0.0.0
None	**Closed or Informational Issues** Comments in the report identified these issues as closed or informational typographic errors	Not reviewed, non- significant issue
463	**Issues Written Against System Change Notes** Changes during Unity v.4.0.0.0 testing were reported in System Change Notes. The role of the VSTL in the FCA process is to determine if changes were tested appropriately and determine how they should be incorporated into certification testing. This discrepancy identifies inadequate documentation of testing. The	As these are findings for functional test scope they remain open in Unity v.4.0.0.0; iBeta shall examine the change notes as part of the FCA Document Review for relevance to the Unity v.3.2.1.0 test scope

SysTest #	Assessment Finding	Disposition
	VSS instructs the VSTL to test if testing is inadequate. This is not a discrepancy but rather an FCA finding.	

2.1.1.3 Identification of Unity 3.2.1.0 Additional Testing

The EAC approved a Unity v.4.0.0.0 Test Plan. At the time of the suspension of SysTest they had completed System Level Functional, Usability, Accessibility, Maintenance, Data Accuracy, and Reliability on the M100. The Volume, Stress, Error Recovery and Security testing of the M100 had not been completed.   An FCA documentation review was completed to determine the VSS requirements applicable to security, volume, stress, performance and recovery testing for the M100, as well as incorporation of the SysTest open in-scope functional discrepancies 428 and 475. Using the EAC certified Unity 3.2.0.0 voting system testing as a baseline iBeta examined the Unity 3.2.1.0 system limitations and security documentation provided to determine the required content of the Volume, Stress, Error Recovery and Security testing. Lastly reports to the EAC Clearing House were examined to identify security issues relevant to the scope of the Unity 3.2.1.0 certification test effort (see section 4.5).

FCA Document Review Result: iBeta shall initiate Volume, Stress, Error Recovery and Security testing of the changes from the EAC Certified Unity 3.2.0.0 baseline. Determination of reuse is pending decision by the EAC. The EAC reuse of testing review process shall be identified in the as run test plan submitted with the test report.

2.1.2 PCA Document Review

The EAC Certified Unity 3.2.0.0 Technical Data Package was transferred to the Unity 3.2.1.0 certification test effort. Unchanged documents are accepted for reuse without additional review. ES&S submitted both changes to documents submitted in Unity 3.2.0.0 and new documents which reflected the expanded scope of Unity 3.2.1.0. These new and changed documents were submitted to a PCA TDP Documentation Review to assess compliance with the requirements of VSS 2002 Vol. 2 section 2.

2.1.2.1 PCA Document Review Results

The preliminary PCA Documentation Review of the TDP performed to assess compliance with the requirements of VSS 2002 Vol. 2 section 2, found that the submitted TDP met the requirements except for the five document discrepancies including #13, 14, 17, 21 and 22.   These discrepancies were reported to ES&S. Additionally iBeta verified that all but one of the SysTest document discrepancies for the M100 could be closed.   Resolution of all identified document defects shall be verified prior to completion of the certification test effort. These shall be documented in the *ESS Unity 3.2.1.0 PCA and FCA Discrepancy Report,* which will be included as an appendix in the test report.

Table 8 PCA Document Review Discrepancies & Transferred from SysTest

#	Type	Location	Issue Description	Guideline
3	Docu-ment Defect	ES&S M100 Sys Maint Manual v.5.4 HW Ver. 1.3, 5/17/07	**CLOSED- SysTest Unity 4.0 Testing - Disc: 6** ES&S M100 System Maintenance Manual does not describe how data output is initiated and controlled or how power is converted.	v.2 2.9.1: Introduction f. The description shall include a concept of operations that fully describes such items as: How data output is initiated and controlled; g. The description shall include a concept of operations that fully describes such items as: How power is converted or conditioned;
4	Docu-ment Defect	ES&S M100 SOP	**CLOSED- SysTest Unity 4.0 Testing - Disc: 26** ES&S M100 System of operations document did not provide a schedule for the software installation.	v.2: 2.8.5: Operating Procedures g. Supports successful ballot and program installation and control by election officials, provides a detailed work plan or other form of documentation providing a

#	Type	Location	Issue Description	Guideline
				schedule and steps for the software and ballot installation, which includes a table outlining the key dates, events and deliverables
5	Docu-ment Defect	Unity 4.0 Discrepancy Report 05/18/07 (SysTest) ES&S M100 SOP FW Ver. 5.4.0.0, HW Rev. 1.3, February 29, 2008	**From SysTest Unity 4.0 Testing - Disc: 27** ES&S M100 System of Operations does not provide procedures for product acquisition there is no reference to PDTR readiness testing documents, and does not provide information on system maintenance, correction of defects, and incorporating hardware and new software releases. (Note: Chapter 13: Combining M100 and iVotronic Results, Pre-election day setup heading, Test the PEB Setup subheading is out of scope of Unity 3.2.1.0. It will be testing in Unity 4.0 when the iVotronic is added.) 8/7/09 Reject - SLE: Chapter 3: Understanding the Counter and Chapter 7: Maintaining the Counter does not contain information on understanding or maintaining the counter. 8/7/09 Accept -SLE - Verified in M100 SOP FW dated 10/17/08 Operations Support FAQ addresses system purchased, installation, setup , training needed, and with a checklist; Product acquisition and PDTR readiness testing, is addressed in Chapters 1, 3:, 6, 10, & 11. System maintenance, correction of defects, and incorporating hardware and new software releases, are addressed in the Chapter 1, 2, 4, 7, 9 & 12	v.2: 2.8.6: Operations Support a. Defines the procedures required to support system acquisition, installation, and readiness testing. These procedures may be provided by reference, if they are contained either in the system hardware specifications, or in other vendor documentation; b. Describes procedures for providing technical support, system maintenance and correction of defects, and for incorporating hardware upgrades and new software releases.
6	Docu-ment Defect	ES&S M100 SOP FW V.5.4.0.0, HW rev1.3 11/16/07	**CLOSED- SysTest Unity 4.0 Testing - Disc: 372** ES&S M100 System of Operations documents do not indicate how the scanners track or report on paper provisional ballots.	VVSG Vol. I, Section 2.4.2: Consolidating Vote Data All systems shall provide a means to consolidate vote data from all polling places, and optionally from other sources such as absentee ballots, provisional ballots, and voted ballots requiring human review (e.g., write-in votes).
8	Docu-ment Defect	ES&S Sys Overview V.4.0.0.0 8/22/08	**CLOSED-SysTest Unity 4.0 Testing - Disc: 551** ES&S M100 System Overview does not state that the scanner can be used as a central count scanner as stated in the M100 SOP, chapter 1.	V2: 2.2.1.b The system description shall include written descriptions, drawings and diagrams that present: A description of the operational environment of the system that provides an overview of the hardware, software, and communications structure
9	Func-tional Defect	ERM v. 7.5.0.0 40HTEST1 TC	**Issue 35 transferred from Unity 3.2.0.0** **From SysTest Unity 4.0 Testing - Disc: 475** Numbered Key - Districts report is showing two M650 groups and the iVo PEB group does not appear; however, the PEB totals match the totals appearing alongside the second M650 group totals (it appears that the 'label' is incorrect and should read 'IVO PEB"). I then went into add/change groups and switched the location of the M650 group and the M100 group, regenerated the report and we now show two M100 groups and again the iVo totals appeared under the second M100 group. It seems	V1: 4.4.4.a, b Voting systems shall meet these reporting requirements by providing software capable of obtaining data concerning various aspects of vote counting and producing reports of them on a printer. At a minimum, vote tally data shall include: a. Number of ballots cast, using each ballot configuration, by tabulator, by precinct, and by

#	Type	Location	Issue Description	Guideline
			the report is mimicking the name in group three into group four, but applying the correct totals. Copies of the report and screen shot of the add/change groups faxed to vendor.	political subdivision; b. Candidate and measure vote totals for each contest, by tabulator;
13	Docu-ment Defect	ES&S SW Design Spec Model 100 Unity v.3.2.1.0 8/11/09	The Hardware Environment and Constraints section mentions DS200, not the M100

In the "ES&S Software Design Spec Model 100" manual, in the HARDWARE ENVIRONMENT AND CONSTRAINTS table, the "Peripheral device interface hardware" hardware characteristic description says "PCMCIA SRAM card are the devices interfacing with the DS200", but does not mention the M100. | V2:2.5.5.1.d Hardware Environment and Constraints - The vendor shall identify and describe the hardware characteristics that influence the design of the software, such as: d.) Peripheral device interface hardware; |
| 14 | Docu-ment Defect | ES&S System HW Spec Model 100 Unity v. 3.2.1.0 8/11/09 | Electromagnetic Environment section mentions DS200, not M100

In the ES&S System Hardware Specification Model 100 manual, the ELECTROMAGNETIC ENVIRONMENT section refers to the DS200, but does not mention the M100. | V2:2.4.2.b The vendor shall provide sufficient data, or references to data, to identify unequivocally the details of the system configuration submitted for qualification testing. The vendor shall provide a list of materials and components used in the system and a description of their assembly into major system components and the system as a whole. Paragraphs and diagrams shall be provided that describe: b.) The electro-magnetic environment generated by the system |
| 17 | Docu-ment Defect | Requirement s of the 2005 VVSG Trace to Vendor Testing and TDP 8/11/09 | The location of the System Change Notes for Unity 3.2.1.0 was not identified.

Unity 3.2.1.0 is a change to Unity 3.2.0.0. Submission of Change Notes was not identified (see V2:2.13 a - d for the required content of the System Change Notes) | V2: 2.13 Vendors submitting a system for testing that has been tested previously by the test authority and issued a qualification number shall submit system change notes. |
| 21 | Docu-ment Defect | ES&S System Overview Unity v. 3.2.1.0 8/11/09 | M100 absent from Table of Contents in System Overview document.

The M100 is absent from Table of Contents, even though it appears as item 1.2.1 in the Operational Environment section. | V2:2.1.1.3 The TDP shall include a detailed table of contents for the required documents, an abstract of each document and a listing of each of the informational sections and appendices presented. |
| 22 | Docu-ment Defect | ES&S System Overview Unity v. 3.2.1.0 8/11/09 | M100 absent from System Description in System Overview document.

The M100 is absent from the chart in the System Description section, even though it appears as item 1.2.1 in the Operational Environment section. | V2:2.2.1.b The system description shall include written descriptions, drawings and diagrams that present: b. A description of the operational environment of the system that provides an overview of the hardware, software, and communications structure; |

2.1.3 PCA Source Code Review

The audit of the 3% review of the ES&S Unity 3.2.1.0 source code in accordance the EAC instructions (see section 1 Introduction) for assessment and recommendation for reuse of the applicable Unity v.4.0.0.0 PCA Source Code Review conducted by SysTest.

2.1.3.1 Documentation of the 3% Source Code Review Process

The 3% source code review was conducted using iBeta's PCA Source Code Review Procedure. The source code was delivered from SysTest and configuration managed in the iBeta Source Code Repository. iBeta reused the language specific interpretations of the generic VSS 2002 requirements used in Unity 3.2.0.0 for the C and COBOL source code review.   The VSS 2002 requirements applicable to the source code review included: volume 1 sections 4.2.2 through 4.2.7, 6.2 and 6.4.2; and volume 2 sections 2.5.4.d and 5.4.2.

To select the 3% for review iBeta used a static analysis tool to parse application source code base to obtain a list of the files and functions, in addition to a Lines of Code (LOC) count. iBeta used executable LOCs only, excluding comment, blank, or continued lines in the metrics. As our static analysis tools did not address COBOL, the number of files and files sizes were used to determine the 3% of code to review. Spreadsheets were populated for each application. The selection of files/functions was based upon the file header information documenting the file purpose. iBeta focused the review by selecting source code files and functions that process vote data, audit logs, and reporting.

A peer review of the M100 Source Code Review was conducted by an experienced reviewer who had reviewed source code to the VSS requirements on a minimum of two VSTL test efforts. Based on the EAC's August 4th instruction, "This review will focus on important functional sections of the code in order to determine the depth and focus of source review conducted by SysTest", the peer reviewer examined the identified results and source code to confirm the accuracy of the review.

Table 9 3% Source Code Review

Product	Source Code Language	Version Submitted to SysTest	Submitted to SysTest	Spreadsheet	Lines Reviewed	Total Lines	Total Issues	EAC Issues
Unity 3.2.1.0 Firmware								
Model 100								
M-100	C	5.4.0.0	6/20/07	C M100 5.4.0.0 Source Code Review	798	21287	0	0
Totals					798	21287	0	0
Percentages						3.7%		0%

2.1.3.2 Summary of 3% Source Code Review Results

Precedence for the iBeta interpretation has been established with testing for other clients and these established interpretations were applied to Unity 3.2.1.0. Zero discrepancies were identified.

2.1.3.3 Recommendation Regarding the Reuse of the SysTest Source Code Review

In order to provide a recommendation, iBeta evaluated the results of the 3% source code review. As there were zero discrepancies written that potentially impact the source code, iBeta recommends reuse of the results of the SysTest source code. The EAC approved the SysTest M100 source code review for reuse in *9 11 09 Approval Source Code Final*.

2.1.3.3.1   A Change Revises the Baseline for the M100 Trusted Build

Following completion of the 3% review ES&S submitted a change to address a gap in audit logging that was identified in the Unity 3.2.0.0 testing of the DS200. iBeta conducted a 100% review of the change. There were no issues identified in the source code review. This revised the Unity 3.2.1.0 baseline for the trusted build to v.5.4.1.0.

2.1.4 Reused Environmental Hardware Assessment

In *8 04 09 ltr to ESS Reuse of Testing Final* the EAC has authorized the reuse of the hardware testing conducted by SysTest' sub-contractors on the M100. In order to ensure that these test results provided sufficient documentation of the Environmental Hardware test assessment and results iBeta reviewed the reports to confirm any failures resulting in engineering changes were documented and the reports document that the M100 passed.

The result of the review generated requests for additional documentation. These requests were documented in discrepancies 1, 2, 27, and 28. These issues are traced to the *Environmental Test Report Matrix* in Appendix B.

Table 10 Environmental Hardware Test Report Review

No.	Location	Issue Description	Standard- Requirement	ES&S Response	Resolution Validation
1	M100 HW Report - Criterion 080424-1241 Section 1.3	The potentially reusable M100 ESD test report does not identify the equipment serial number. Section 1.3 Equipment under test identifies the model but not the serial number of the unit that went through hardware testing.	v.2: 4.6.1.1 Equipment identification… shall be recorded.	ES&S has withdrawn their request to reuse this ESD report.	In accordance with NOC 08-001 an ESD test will be conducted on the M100
2	M100 HW Report - Criterion 080424-1241 & ECO 775 Change Evaluation	There is no clear connection between potentially reusable M100 ESD test report and documentation of mitigation conducted during testing. ECO 775 Change Evaluation identifies a mitigation to the M100, however no failure nor validation resolution is documented in the either the SysTest Discrepancy Report or the sub-contractor ESD Test Report. The ECO 775 Change Evaluation identifies *"changes were modeled in the M100 and allowed it to pass ESD testing on 5/2/2008".*	v.1: 9.6.2.6 The ITA shall evaluate data resulting from examinations and tests employing the following practices: a: If any malfunction ... is detected that would be classified as a relevant failure using the criteria in Vol.2, its occurrence ... shall be recorded for inclusion in the analysis of data obtained from the test... EAC NOC 07-005 it is the lead VSTL's responsibility to properly test the voting system and accurately report those tests to the EAC.	ES&S has withdrawn their request to reuse this ESD report.	In accordance with NOC 08-001 an ESD test will be conducted on the M100
27	ES&S Retest Matrix v.1.16 - M100 testing (SysTest) Sun Micro-systems APT Test Service Report APT Job # 06-00329 (Final Approval 7/21/06)	Potentially reusable Unity 4.0 hardware test results do not identify whether the M100 passed or failed. Nor does it identify the VSS or corresponding international test standard The matrix indicates the APT report contains the results of M100 testing on page 3. The report does not provide pass/fail results. The report lists an order of tests but these test do not identify either the VSS or international standard corresponding to the identified test.	v.2: B.5 The test report shall be organized so as to facilitate the presentation of conclusions …a summary of test results …	Pending response	
28	Unity 4.0 Discrepancy Report 10/28/08	Potentially reusable Unity 4.0 hardware test results contain no identification of the mitigation	v.1: 9.6.2.6.e The ITA shall evaluate data resulting from examinations and tests employing the following practices:	9/8/09 -A copy of ES&S ECO 682, images of the ferrite and SysTest ECO	9/8/09 Accept C Coggins, Verified that ECO 682 documentation

No.	Location	Issue Description	Standard- Requirement	ES&S Response	Resolution Validation
	(SysTest) (Criterion) EMC Qualification Test Report ES&S Voting System, M100 060530-1050 6/29/06	manufacturing change note. On page 48 of the sub-contractor (Criterion) report mitigation occurred in the RF Immunity Test (Stewart part No. 28S0670-000 flat split type ferrite placed on ribbon cable close to J8). There is no identification of an Engineering Change corresponding to the mitigation.	Any and all failures that occurred as a result of a deficiency shall be classified as purged, and test results shall be evaluated ...if the 1) vendor submits a design, manufacturing ... change notice...	682 Completed Evaluation was provided by ES&S	corresponds to the mitigation described on page 48

3 Materials Required for Testing

The System Identification stipulates the following materials required for testing of ES&S Unity 3.2.1.0 voting system.

3.1 Voting System Software

The software listed in Table 11 is the documented configuration of the ES&S Unity 3.2.1.0 voting system used to perform system testing. . (Vol.2 Appendix A. 3.1)

Table 11 Voting System Software

Application	Manufacturer	Version	Description (identify COTS)
Election Management Software			
Election Data Manager	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) with Ballot On Demand (BOD)	ES&S	7.7.1.0	Unity election management system desktop publishing tool to layout and format paper ballots BOD is an optional operating mode in ESSIM used to print election quality ES&S paper ballots on a COTS OKI 9600 HDN color laser printer.
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
AIMS (Automark information Management System)	ES&S AutoMARK	1.3.157	A windows-based election management system software application to define election parameters for the VAT, including functionality to import election definition files produced by the Unity EMS and create VAT flash memory cards
Voter Assist Terminal (VAT)	ES&S AutoMARK	1.3.2906	A software application to assist multilingual voters and voters with visual, aural or dexterity disabilities to vote a paper ballots in a private manner
Election Reporting Manager (ERM)	ES&S	7.5.5.0	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

Application	Manufacturer	Version	Description (identify COTS)
			Log feature is disabled or not configured properly.
Excel 2003 (Microsoft Office)	Microsoft		COTS software used by AIMS to import audio scripts
Microsoft Windows XP	Microsoft	Service Pack 3	COTS personal computer operating system.
Acrobat Standard	Adobe	9	COTS software used with ESSIM to create ballot files for printing.
RM/COBOL		11.01	COTS interpreter software used in HPM & ERM
Adobe Type Manager	Adobe	4.1	COTS software used with ESSIM to create ballot files for printing
AVG Anti-Virus	AVG	8.5	COTS Anti Virus protection for PCs and Servers
Polling Place			
intElect DS200	ES&S	1.3.10.0	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. Administrators can request custom ballot acceptance criteria, which ES&S programs onto the scanner's election definition.
M100	ES&S	5.4.1.0	Precinct-based, voter-activated paper ballot counter and vote tabulator. The M100 simultaneously read both sides of the ballot, and record the voter selections. The M100 may also be used as a central tabulator but functionality is no different than Precinct Count tabulator. Optional connection of a COTS results printer which overrides operation of the M100 printer when connected
Central Count			
Model 650 (M650)	ES&S	2.2.2.0	Central count high-speed optical scanner paper ballot tabulator. The scanner checks the pre-printed codes along the ballot edge to determine each ballot's precinct, split and type. The M650 prints results reports to an external printer and saves results to a zip disk.

3.2 Voting System Hardware and Equipment

The equipment listed in Table 12 is the documented configuration of the ES&S Unity 3.2.1.0 voting system used to perform system testing. . (Vol.2 Appendix A. 3.2)

Table 12 Voting System Hardware and other Equipment

Hardware or Equipment	Manufacturer	Version	Description (identify COTS)
EMS - Client/Server Configuration			
Optiplex 760 SN: 3x6fkk1	Dell	Windows XP SP3	COTS: PC being used as the Ballot Preperation in a Client/Server configuration setup.
Optiplex GX270 SN: DNC2F51	Dell	Windows XP SP3	COTS: PC being used as the ERM in a Client/Server configuration setup.
Latitude E6400 SN: GD4D6H1	Dell	Windows XP SP3	COTS: Laptop being used as the ERM in a Client/Server configuration setup.
OptiPlex 760 SN 2HF3CK1	Dell	Windows XP SP3	COTS: PC being used as the ERM in a Client/Server configuration setup.
PowerEdge 600SC X0873024	Dell	Windows 2003 Server	COTS: Server PC in a Client/Server configuration setup.
10/100 Dual Speed Hub w/Switch H0GH315000171	D-Link	N/A	COTS: Network Hub for a Closed Network LAN configuration in a Client Server setup
Sandisk Reader Model SDDR-92	ImageMate	None	COTS: Device used to read and write election files to compact flash cards for VAT
(2) OmniDrive USB Professional SN: 790-USB2 SN: 21430-USB	PCMCIA card reader/writer for M100	Setup-CD V2.41 & V3.13	COTS: Drive for reading and writing to SRAM media cards for M100
EMS - Peer to Peer Configuration			
Optiplex GX260 SN: SN: 7D0WL21	Dell	Windows XP SP3	COTS: PC being used as the Ballot Preperation in a Peer to Peer configuration setup.
Sandisk Reader Model #SDDR-91	ImageMate	None	COTS: Device used to read and write election files to compact flash cards for VAT
Latitude E6400 SN: 137FMJ1	Dell	Windows XP SP3	COT: Laptop being used as the ERM in a Peer to Peer configuration set up
10/100 Dual Speed Hub w/Switch SN: 0100/LT4G1H0083212	D-Link	N/A	COTS: Network Hub for a Closed Network LAN configuration in a Peer to Peer etup
(2) OmniDrive USB Professional SN: 8814-USB2 SN: 23728-USB	PCMCIA card reader/writer for M100	Setup-CD V2.41 & V3.13	COTS: Drive for reading and writing to SRAM media cards for M100
M650			
M650 Tabulator SN: 2406 8013- Green, Right Oval	ES&S	HW Rev 1.1 FW 2.2.2.0	Central count optical scanner that has color specific optical light and reads right ballot oval.

Hardware or Equipment	Manufacturer	Version	Description (identify COTS)
M650 Tabulator SN: 7003 – Red, Left Oval SN: 1102 7011 - Green (Left)	ES&S	HW Rev 1.2 FW 2.2.2.0	Central count optical scanner that has color specific optical light and reads left ballot oval.
(2) LQ-590 Printers SN: FSQY093447 SN: FSQY094255	Epson	Model: #P363A	M650 Log and Results report printers (COTS)
(4) Microline 520 Printer SN: 407D4010960 SN: 407D4010894 SN: 204A2005641 SN: 407D4011099	Okidata	Model: GE5258A	M650 Log and Results report printers (COTS)
Belkin Universal Power Supply SN: 20V06516228WE SN: 20V06516249WE SN: 20V06516248WE	Belkin	N/A	COTS: M650 Power Supply
Iomega Zip Drive Z250USBPCMBP SN: 1GBS2250K7	Iomega	N/A	COTS: Central Count M650 Disk Reader/Writer
Iomega Zip Zip M100MB Disks	Iomega	N/A	COTS: Election data and results media
DS200			
(2) ES&S intElect DS200 SN: ES0107370025 SN: ES0107360007 SN: ES0107370002	ES&S	HW 1.2.1 FW 1.3.10.0	Precinct Count Digital Scanner (Modem removed in Unity 3.2.0.0)
Thumb Drive 512MB 2GB, 4GB & 8GB	Delkin	N/A	COTS: Media for installing election definition, recording and reporting votes and audit logs
Ballot boxes			
(2) Steel Ballot Box P/N 76245-10, SN: 1573 P/N 76246, SN: C4243	ES&S	N/A	Precinct Steel Ballot Box for M100 and DS200, No Diverter (SN:1573) Diverter (SN:C4243)
(2) Plastic Ballot Box P/N 94050 P/N 94098 SN: NONE	ES&S	N/A	Precinct Plastic Ballot Boxes for DS200, No Diverter No Diverter
M100			
(4) ES&S Model 100 SN: 205071 SN: 202975 SN: 015483 SN: 231531	ES&S	HW Rev 1.3.0 FW 5.4.1.0 Bios v 2.02 OS v 4.22	Precinct Count Optical Scanner (modem removed)
AutoMARK VAT			
AutoMark Voter Assisted Terminal SN: AM0106430376	ES&S	Model A100 HW Rev 1.0 FW 1.3.2906 OS 5.00.14 PEB 1.65 SBC 1.0	Accessible paper ballot marking device original release – multiple cable connector and printed circuit boards are mounted in the lower portion of the VAT
AutoMark Voter Assisted Terminal SN: AM0206443384	ES&S	Model A200 HW Rev 1.1	Accessible paper ballot marking device.

Hardware or Equipment	Manufacturer	Version	Description (identify COTS)
		FW 1.3.2906 OS 5.00.14 PEB 1.65 SBC 2.0	Change: Consolidate PCB, relocate PCB and cables to upper portion for easier maintenance
AutoMark Voter Assisted Terminal SN: AM0208470815	ES&S	Model A200 HW Rev 1.3.1 FW 1.3.2906 OS: 5.00.19 PEB: 1.70 SBC: 2.5	Accessible paper ballot marking device Change: PEB FW to support Enhanced AutoCast and Double Spit & Wipe (Note: Enhanced Auto Cast is not supported in this version of the VAT FW.)
AutoMark Voter Assisted Terminal SN: AM0208470767	ES&S	Model A200 HW Rev 1.3.1 FW 1.3.2906 OS: 5.00.19 PEB: 1.65 SBC: 2.5	Accessible paper ballot marking device Change: LCD replacement, ROHS board components, change CPU and Flash Chips on the SBC board FW, Win CE OS Bootloader for P30 flash, OS update to support DST and Hash check (Note: Hash check is not supported in this version of the VAT FW)
Ballot-on-Demand			
COTS - HDN color laser printer			Note: All testing of this product was completed by SysTest Labs; iBeta did not receive this hardware

3.3 Testing Software, Hardware and Materials

The software, hardware and materials listed in Table 13 are needed to support system testing and test simulations of elections of the ES&S Unity 3.2.1.0 voting system. (Vol.2 Appendix A. 3.3)

Table 13 Testing Software, Hardware and Materials

Software, Hardware or Material	Description	Description of use in testing
DS200		
Delkin Thumb Drive 512MB 2GB, 4GB & 8GB	Storage media for the DS200	COTS: Media for installing election definition, recording and reporting votes and audit logs
M650		
Iomega Zip Disk 100MB	Storage media for the M650	COTS: Media with election definition and results totals for M650
ES&S M650 Output Tray	Central Count Ballot Output Tray	Central Count Ballot Output Tray for ballots scanned
M100		
Vikant Corporation PCMCIA SRAM Card 512k, with a Panasonic 3V Battery BR2325	Storage media for M100	COTS: Media for installing election definition, recording and reporting votes and audit logs
Centon 512k P/N: SN5512 4meg P/N: SN5004	Storage media for M100	COTS: Media for installing election definition, recording and reporting votes and audit logs

Software, Hardware or Material	Description	Description of use in testing
AutoMARK VAT		
SanDisk CompactFlash Memory Card 256MB	Storage media for the VAT	COTS: Media for installing election definition on the VAT
AutoMark Inkjet Print Cartridge	Print cartridge for VAT	Replacement ink cartridges for VAT
Foot Pedal	Alternative vote input device for VAT	Allows the user to alternatively cast votes.
AutoMark Programming Cable	Cable use for AutoMARK firmware Installs	Used to install frimware on the AutoMARK
Test Material		
Paper rolls	Paper, Thermal Printer	COTS: DS200 and M100 reports
Paper Ballots	Paper Ballots - 11", 14", 17" & 19", 3 and 4 ovals per inch	Supplied by ES&S: Miscellaneous ballots for VAT, DS200, M100, M650 with preprinted election content, and blank ballot stock for VAT audit log
Paper	81/2 x 11 Printer paper

M650 Continuous feed paper | COTS: for reports from AM, EDM, ESSIM, HPM, ERM reports

COTS: for Central count (M650) audit log and reports |
HP LaserJet Printer 4050N SN: 600004	Report Printer	COTS: Used for printing reports from EDM, HPM, ERM, and ESSIM for the Peer to Peer setup.
Ballot Marker Pens	Marking Device	COTS: VL Ballot Pen to mark paper ballots
OKI Printer B410dn	Network Printer	COTS: Used for printing reports from PCs connected to Hubs for Server setup.
Ethernet Cables	Cables for the LAN	COTS: Transfer election management data among workstations and/or servers on the EMS LAN
Test Management and Tools		
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
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
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

Software, Hardware or Material	Description	Description of use in testing
		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
Symantec Ghost v. 11	Image capture tool	Supplied by iBeta: used to capture and test environments.
SLAX LIVE W/ SHA1DEEP	Hash creation tool	Supplied by iBeta: used to generate hash signatures for the M100

3.4 Deliverable Materials

Documents listed in Table 14 are delivered, to the purchaser, as part of the Unity 3.2.1.0 voting system.

Table 14 Unity 3.2.1.0 Voting Systems User Documents

Title	Version	Date	Author (Organization.)
Unity 3.2.1.0 (Modifications to the ESSUnity3200)			
Election Systems & Software System Overview Unity v. 3.2.1.0	3.0	08/11/09	ESS
ES&S M100 System Maintenance Manual Firmware Version 5.4.0.0 Hardware Version 1.3	None	08/11/09	ESS
ES&S Model 100 System Operations Procedures Firmware Version 5.4.0.0 Hardware revision 1.3	None	08/28/09	ESS
ES&S System Security Specification Version Release 3.2.1.0	None	08/28/09	ESS
Election Systems & Software Model 100 Validation Guide	2.0	08/18/09	ESS
Hardening Procedures for the Election Management System PC	None	09/08/09	ESS
Combining M100 and iVotronic Results at the Precinct Handout	None	07/31/09	ESS
Model 100 Election Day Checklist Version Number 5.4.0.0	None	07/31/09	ESS
Model 100 Pre-Election Day Checklist Version Number 5.4.0.0	None	07/31/09	ESS

The materials listed in Table 15 are to be delivered, to the purchaser, as part of the ES&S Unity 3.2.1.0 voting system. (Vol.2 Appendix A.3.4)

Table 15 Voting System Materials

Material	Material Description	Use in the Voting System
Software Installs		
Audit Manager (AM) SW: 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	EMS audit log software for election definition and ballot preparation applications
Election Data Manager (EDM) SW: 7.8.1.0	A Unity election management system software application to define and store jurisdiction and election data	EMS software for election definition and ballot preparation of the M650 and DS200
Ballot Image Manager (ESSIM) with Ballot On Demand (BOD) SW: 7.1.1.0	A Unity election management system desktop publishing tool to layout and format paper ballots BOD is an optional operating mode in ESSIM to print election quality ES&S paper ballots on a COTS OKI 9600 HDN color laser printer.	EMS software for paper ballot preparation
AutoMARK Information Management System (AIMS) SW: 1.3.257	A windows-based election management system software application to define election parameters for the VAT and create VAT flash memory cards. AIMS	EMS software to program the election definition for the VAT

Material	Material Description	Use in the Voting System
	includes functionality to import election definition files from Unity EMS.	
Hardware Programming Manager (HPM) SW: 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	EMS software to program the election definition on the optical and digital scanners
Election Reporting Manager (ERM) SW: 7.5.5.0	A Unity central count election management system software application to consolidate, tally and report election results	EMS software for importation and consolidation of election results from the M650 and DS200
Log Monitor SW: 1.0.0.0	A Unity software application to track ES&S Unity applications and window events.	EMS software to 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.
DS200 Precinct Count Tabulator		
intellect DS200 (DS200) FW: 1.3.10.0	A Unity precinct count digital scanner	Digital Scan tabulator
Delkin Thumb Drive 512M, 2GB, 4GB & 8GB	Storage media for the DS200	COTS: Media for installing election definition, recording and reporting votes and audit logs
M650 Central count Tabulator		
Model 650 (M650) FW: 2.2.2.0	A Unity central count option scanner.	Central count vote tabulator, configured for use with left or right ovals and green or red optical read light
Iomega Zip Disk 100MB	Storage media for M650	COTS: Media with election definition and results totals for M650
Okidata GE5258A Microline 520 Printer	COTS printers used for M650 reporting	COTS: Central count vote tabulator report and audit log printers
M100		
ES&S Model 100 FW: 5.4.1.0	A Unity precinct count optical scanner	Precinct count vote tabulator
Vikant Corporation PCMCIA SRAM Card 512k, with one or more of the following recommended batteries: Panasonic BR2325 Panasonic CR2025 PAYOVAC BR2325	Storage media for M100	COTS: Media for installing election definition, recording and reporting votes and audit logs
Centon PCMCIA Cards 512k P/N:	Storage media for M100	COTS: Media for installing election definition, recording and reporting votes and audit logs
AutoMARK Voter Assisted Terminal		
AutoMark Voter Assisted Terminal (VAT)	An accessible paper ballot marking device for the Unity voting system	Audio and non-manual input device to record votes on Unity paper ballots.

Material	Material Description	Use in the Voting System
Model: A100 Model: A200		
SanDisk CompactFlash Memory Card 256MB	Storage media for the VAT	COTS: Media for installing elections definition onto the VAT
Optional COTS equipment that can be purchased from ES&S		
HP LaserJet Printer 4050N	Printer for printing reports	COTS: Prints results and audit log report on 8.5 x 11 paper. Jurisdictions can purchase any printer that prints 8.5 x11 pape.
Ballot Marker Pens	Marking Device	Supplied by ES&S: VL Ballot Pen to mark paper ballots
Paper ballots (11, 14, 17 or 19 inch)	Paper ballots	Record votes on paper
Okidata C9600/9650HDN PN: 58273508 HDN color laser printer	A high quality COTS printer for printing Ballots on Demand	Print a limited number of ballots at the election office Printers purchased from sources other than ES&S may not work properly with BOD.
Laptops and/or PCs	EMS computers	ES&S provides COTS computers to specification upon request. Jurisdiction can purchase any computer wiht the following recommended specification: 4 CPU 2.80GHz, 512MB of RAM, Windows XP, SP3
Network and/or LaserJet printers	EMS printer	Network printer

3.5 Proprietary Data

All software, hardware, documentation and materials shall be considered by iBeta as proprietary to ES&S. None of the elements submitted for certification testing may be used outside the scope of testing. No release or disclosure may occur without the written authorization of ES&S. Authorization for release to the EAC is contained in the MSA contract. ES&S shall be responsible to ensure that any TDP materials they deem confidential and protected from release are appropriately marked prior to submission to iBeta, per section 10 of the EAC Program Manual. iBeta shall notify ES&S when materials are submitted to the EAC.

No information submitted to the EAC in this test plan has been identified by ES&S as subject to restriction on use, release or disclosure.

When iBeta provides internal process documentation to the EAC to assist in the review of their test plan this information includes programming language specific review criteria and test case detail. These documents are tendered in separate electronic files and identified as confidential and protected from release as a trade secret because they are a description of how the process is performed and the end result of substantial effort. This information is explicitly prohibited from release by the FOIA and the Trade Secrets Act (18 U.S.C. §1905).

4 Test Specifications

Certification testing of the ES&S Unity 3.2.1.0 voting system is to the configuration submitted in the EAC application #ESS0307 to the requirements of the VSS 2002.

The test methods in Section 7 of this test plan identify the test operation procedures, i.e. how testing to the VSS 2002 will be implemented and the organizations responsible for the testing. The test method is used to create a test case which contains the information necessary to reproduce testing.

Testing for the system level (functional and integration), environmental, accuracy, reliability, availability and characteristics (recovery, usability, accessibility, and maintainability) test cases was performed by SysTest. Based upon the precedent set in Unity 3.2.0.0 ES&S has petitioned the EAC for reuse of the M100 testing. The EAC reuse of testing review process is contained in Appendix C.

Volume, stress, security, telephony and cryptographic test methods for the Unity 3.2.1.0 voting system were developed by iBeta following a review of the EAC approved *Unity 4.0.0.0 Test Plan*, the 3% Source Code Review Assessment, the system limitations and security documentation for the modifications to the EAC certified Unity 3.2.0.0 voting system. The test methods prepared for the modifications are contained in Section 7. A test case is developed from each test method. Documentation of all test iterations shall be maintained in the test case with a separate record of the configuration and results of each test execution.

4.1 Requirements (Strategy for evaluating sections of the VSS 2002)

The strategy for evaluation of any voting system submitted for certification is to confirm that it conforms to the Volume 1 requirements of the VSS 2002. This overall approach is the same for all voting systems submitted for certification to the VSS 2002. The certification test scope of the voting system is identified as initial submission or a modification. All submitted systems must meet all applicable requirements. Initial submissions must be tested for all requirements. Modified systems must only be tested for the modification, with reuse of the EAC certified unmodified portions validated in a functional system level regression test.

- **Section 1 Introduction**: Identification of the relevant and non-relevant definitions applicable to the voting (see section 1).
- **Section 2 Functional Capabilities:** Following the assessment of scope, iBeta identifies the relevant and non-relevant requirements of the voting system submitted for certification testing and optional functionality incorporated into the voting system by the manufacturer. The relevant requirements, optional functionality, accessibility features and supported voting variations are assessed in order to customize iBeta's standard FCA Functional System Level Test Cases for the submitted voting (see sections 2, 4, and Appendix A)
- **Section 3 Hardware Standards:** Following the assessment of scope, iBeta identifies the relevant and non-relevant requirements. The relevant requirements are assessed in order to customize various iBeta standard test cases. The FCA Environmental Test Case is customized for the environmental performance requirements. The FCA Functional System Level and FCA Volume Test Case are customized for the EMS, vote recording, paper based conversion, vote processing, reporting, and vote data management performance requirements. The FCA Characteristics Test Case addresses the physical aspects of the voting system hardware (DREs, precinct scanners, central scanners and ballot marking devices), including the physical characteristics, maintenance, reliability, maintainability, and availability requirements of the voting system submitted for certification testing. As the accurate display, recording, storing, and reporting of ballot information and votes is applicable to all voting system functions, accuracy performance requirements are included in the FCA Functional System Level Test Cases, FCA Accuracy Test Case, FCA Volume Test Cases, FCA Security Test Case, FCA Characteristic Test Case, and FCA Environmental Hardware Test Case (see section 2, 4, Appendix A & B)
- **Section 4 Software Standards:** Following the assessment of scope, iBeta identifies the relevant and non-relevant source code submitted for certification testing. A PCA Source Code Review is conducted as a pre-certification test activity. The source code review requirements are interpreted by iBeta for each submitted language and maintained in an internal library of Language Specific Review Criteria (see section 2.1.3). Functional testing of the relevant audit

and tally software is incorporated into the FCA Functional System Level Test Case and FCA Security Test Case (see sections 2, 4, and Appendix A).

- **Section 5 Telecommunications:** Following the assessment of scope, iBeta identifies the relevant and non-relevant telecommunication requirements of the voting system submitted for certification testing. Verification of the functionality to transmit and receive data electronically using hardware and software components over distances both within and external to the polling place are incorporated into the FCA Telecommunications Test Case (see section 4, 7 and Appendix A).
- **Section 6 Security Standards:** Following the assessment of scope, iBeta identifies the relevant and non-relevant requirements of the voting system submitted for certification testing. The security documentation submitted by the manufacturer is reviewed. The identified access controls, physical security measures, software security, telecommunication, shared operating environments and transmission of official data over public networks are assessed. Methods to verify the adequacy of these security controls are documented in the review, including specific source code reviews, document reviews and functional security tests. When practical functional security testing is incorporated into the FCA Functional System Level Test Cases. Tests that incorporate unique threats are impractical for inclusion in the standard testing. A separate FCA Security Test Case is prepared with voting system specific security testing. (see section 4, 7 and Appendix A) .   While the VSS 2002 does not identify requirements for testing of the system limits of a voting system, testing of these limits is incorporated into the FCA Volume Test Cases (see section 4, 7 and Appendix A).
- **Section 7 Quality Assurance:** These requirements are reviewed in the PCA Document Review stipulated in volume 2, section 2.12. During the certification test process any observed instances of non-compliance with the manufacturers policies in documentation, software or hardware are reported as informational disclosures in the discrepancy report.
- **Section 8 Configuration Management:** These requirements are reviewed in the PCA Document Review stipulated in volume 2, section 2.11. During the certification test process any observed instances of non-compliance with the manufacturers policies in documentation, software or hardware are reported as informational disclosures in the discrepancy report.
- **Section 9 Overview of Qualification Tests:** The requirements of section 9 outline the complete certification test process. It contains process requirements that are applicable to both the manufacturer and VSTL. This section provides guidance to iBeta and the manufacturer of the certification test process rules and definitions. These processes include identification of test scope, test focus, sequence of tests, applicability of tests for new and modified systems, pre-test, test and post test practices, requirements and activities.

4.1.1 Mapping of requirements to the equipment type and features

The mapping of Volume 1 VSS 2002 requirements to the equipment type and features is found in Appendix A.   The *ES&S Unity 3.2.1.0 EAC Matrix* is provided as a separate document. The EAC Matrix identifies Volume 1 & 2 VSS 2002 requirements applicable to both the voting system and the VSTL test process.   It is utilized by the VSTL and EAC in the certification test process review.

4.1.2 Rationale for why some requirements are NA for this campaign

The rationale for identification of specific requirements as not applicable for this campaign is identified in the mapping of requirements.

As identified in the VSS2002 vol.1 section 4.1.2, software is excluded if it:

- Provides no support of voting system capabilities;
- Cannot function while voting system functionality is enabled; and
- Procedures are provided that confirm software has been removed, disconnected or switched.

The following functions are excluded from Unity 3.2.1.0 voting system and are not tested in this certification effort.

- All Direct Recording Electronic (DRE) requirements. Unity 3.2.1.0 is a paper ballot system.
- Provisional ballots: The handling of provisional ballots is procedural. There is no provisional ballot functionality.
- Transmission via Public Telecommunications: There is no transmission via public telecommunications. The DS200 and M100 modem is removed from this certification.

4.2 Hardware Configuration and Design

The baseline hardware configuration of the ES&S Unity 3.2.1.0 voting system submitted for testing is identified in Table 12. It is recorded in the *PCA Configuration Unity 3.2.1.0* document. If during testing there is any change to the configuration of the system, the complete voting system configuration will be recorded on a new tab. The new tab will reflect the date upon which the new configuration was documented. All test cases identified in Tables 17 and 18 will include verification and documentation of the test environment against the applicable PCA Configuration tab

4.3 Software System Functions

Testing of the software system functions defined in the VSS 2002 include the following tasks:

- Identification of the functional test scope based upon the PCA TDP Document Review (Vol. 2, Sect. 2) and FCA review of the ES&S Unity 3.2.1.0 voting system testing (Vol.2 Appendix A.2)
- PCA Source Code Review of all new or changed code (Vol.2 Sect. 5.4) and an assessment for reuse of the Unity 4.0 source code review performed by SysTest on the M100;
- Verification of COTs software and completion of a trusted build by iBeta with the M100 v.5.4.1.0 source code provided by SysTest and modifications to ERM v.7.5.5.0 (from the Unity 3.4.0.0 ERM v.7.5.4.0). iBeta constructed the build and recorded the file signature of the build environment and final build. The process followed the steps outlined in the iBeta *Trusted Build Procedure* to ensure compliance with the section 5.6 of the Certification Program Manual.
- Reuse of the escrowed code from the unmodified applications of the EAC certified Unity 3.2.0.0 voting system
- Development of a Certification Test Plan and Test Cases (Vol. 2, Appendix A)
- Execution of Functional/System Integration Tests including those listed in the Reuse System Level Test Method, Regression System Level Test Case and Volume Test Cases (Vol. 2, Sect. 6)
- Testing of the performance and sequence of system software functions identified in System Operations, Maintenance and Diagnostic Testing Manuals, including those listed in the Reuse System Level Test Methods, Reuse Accuracy Test Method, Reuse Characteristics Test Method and the Volume, Stress, Security, Telephony and Cryptographic Test Cases. (Vol. 2. Sect. 6.8)
- The section 5.7 of the Certification Program Manual specified deliverables shall be provided to the EAC stipulated escrow agency upon certification.

4.4 Test Case Design

4.4.1 Hardware Qualitative Examination Design

iBeta conducted a review of performance characteristics for the modifications to the EAC certified Unity 3.2.0.0 voting system that were identified in the Unity 3.2.1.0 submitted TDP. The review was conducted in accordance with vol. 2 Appendix A.4.3.1 (a-d) of the VSS 2002 and Section 301 of HAVA. As a result of this review it was determined that iBeta will conduct Volume, Stress, Security and Error Recovery testing on the M100 to determine the quality of the hardware design. Security testing shall incorporate the inclusion of a peer-to-peer and client/server network in the EMS. iBeta will also conduct a System Level Regression Test to determine the quality of the overall voting capabilities, pre-voting, voting and post voting functions of the complete ES&S Unity 3.2.1.0 voting system. ES&S petitioned the EAC for reuse of the Environmental, Reliability, Accuracy, Maintenance, Availability, Durability and Safety testing of the M100. The EAC shall assess the SysTest test results of the M100 for the Reuse Characteristic (Usability, Accessibility and Maintenance), Reuse Functional System Level, Reuse Accuracy and Reliability testing identified in the applicable test method. . The EAC reuse of testing review process shall be identified in the as run test plan submitted with the test report. A sampling of maintenance and accuracy functions are incorporated into the System Level Regression Test.

An examination of the M100 shall be conducted to confirm that it does not contain: wireless technology, modems, or use of the public networks and is exempt from such testing. The results of this review will be recorded in the *FCA Telephony and Cryptographic Test Case*.

SysTest and their subcontractors (see section 1) examined the M100 and determined the scope of hardware environmental testing required by the VSS 2002. The EAC conducted a review of the SysTest environmental testing for the M100 in Unity v.4.0.0.0 and approved its reuse. iBeta was tasked by the EAC to review the M100 test reports to confirmed the reports identified the hardware had passed and that any failures identified in the reports had documentation of a matching engineering change. This review was completed as a Pre-certification Test (see section 2.1.4, 4.4.2 and Appendix B).

4.4.1.1 *Mapping of requirements to the M100*

Appendix A contains identifies the VSS 2002 requirements applicable to the M100.

4.4.2 Hardware Environmental Test Case Design

The SysTest's subcontractors listed in section 1 performed hardware testing of the M100 for Unity v.4.0. The review, analysis, testing and test results are contained in the test reports and engineering change assessments listed in the Table 2 - Unity v.4.0.0.0 Test Documents. The EAC issued their approval for reuse of the results of the SysTest Environmental Hardware testing in *8-04-09 Ltr to ESS reuse of testing final.* In order to ensure that iBeta had all documentation of the Environmental Hardware test assessment and results for the M100 iBeta reviewed the reports to confirm they included documentation that the M100 submitted hardware passed the required tests and that any failures resulting in engineering changes were documented. Based upon the discrepancies 1 and 2 indentified in this review ES&S withdrew their request for reuse of the Electrostatic Disruption (ESD) test conducted in 2008. iBeta sub-contractor Criterion Technologies Inc. shall conduct an ESD test as required by in NOC-08-001 (see section 2.1.4).

ES&S submitted engineering changes to the EAC certified DS200 plastic ballot box/case (a new metal lock and bottom edge, modification of the adhesive and washers attaching the foam padding to the case, and reducing the number of ballot boxes per shipping pallet). These changes require an assessment for impact to ESD and Transportation and Storage. The results of the assessment and any required testing shall be documented in the as run test plan submitted with the test report.

As no changes have been submitted to the EAC certified Unity 3.2.0.0 AutoMARK VAT and M650, iBeta has assessed that no environmental testing is required.

4.4.3 Software Module Test Case Design and Data

ES&S has petitioned for reuse of the functional testing performed by SysTest on the M100 in the certification effort of Unity v.4.0.0.0.

The iBeta customized test cases for the modification to the EAC certified Unity 3.2.0.0 include the identification of the controls between the applications, user interfaces, and hardware interfaces with the capture of entry and exit data. (See Table 16, Table 17 and the cross referenced test methods in Section 7.)

4.4.4 Software Functional Test Case Design

Following assessment of the changes of Unity 3.2.1.0 from the EAC Unity 3.2.0.0 certified voting system; iBeta determined that functional testing of the M100 was required. ES&S has petitioned for reuse of the functional testing performed on the M100 by SysTest in the certification effort of Unity v.4.0.0.0. The EAC shall assess the SysTest test results of the M100 for Reuse Functional System Level testing identified in the test method. The EAC reuse of testing review process shall be identified in the as run test plan submitted with the test report.

iBeta additionally followed the process outlined in Section 2.1.1 document review and results and identified the scope of required functional testing outside the ES&S petition for reuse. Testing identified as outside the petition for reuse included Volume, Stress, Error Handling and Security of the M100. A review of the section 1.4.3 System Limits was conducted to assess the limits applicable to the M100 system. This assessment was compared to the volume tests conducted on the EAC certified Unity 3.2.0.0. The M100 limits were not found to impact the customer maximums identified in the Unity 3.2.0.0 certification test effort. iBeta found that Volume 1, 2, and 4 were applicable for the limits on

ballot styles and storage media. It was determined that they would need to be modified to test the limits of the M100. The assessment also determined two additional M100 Volume test cases were necessary to test for M100 precinct limits in early voting and on election day (Volume 11 and 12). The assessment found that Volume 3, 4, 6, 7, 8, 9, and 10 Tests Case were relevant to the EMS and not applicable to the modifications. They were therefore out of scope of the Unity 3.2.1.0 certification test effort.

As part of the assessment iBeta identified:

- Volume conditions to determine that the voting system could successfully prepare and process elections to the maximum capacity without errors for the election criteria listed in Table 17- Volume Tests.
- Stress conditions to verify that the voting system provides an appropriate response to an overloading condition exceeding the maximum capacity for the election criteria listed in Table 17 Stress Tests.
- Error recovery conditions using a three part approach. First, the 3% Source Code Review verified the error response and recovery within the sample of code examined. The results were reported to the EAC for consideration in their determination of reuse of the SysTest Source Code Review The second part of the approach was to force hardware errors for power recovery. The third part was the incorporation of error responses into the Volume and Stress testing such that error recovery would confirm that in exceeding a limit the voting system was able to recovery without losing vote data (see Table 17 Recovery Tests).

The EAC certified Unity 3.2.0.0 voting system functions are identified in the Unity 3.2.0.0 Test Report. A sampling of this functionality, M100 functionality, and the ERM v.7.5.5.0 modifications will be tested by iBeta in the Regression System Level Test Case. This test case shall test a substantial subset of the functional requirements of the Unity 3.2.1.0 voting system. It shall be executed as a system level test with a multi-lingual ballot including the EMS, M100 and DS200 precinct scanners, and M650 central count scanner. Paper ballots shall be cast manually with ES&S specified marking devices and on the AutoMARK VAT in visual and audio modes with audio and non-manual assistive devices.

Greater description of each Test Case is found in the Test Methods (see section 7). Detailed test steps and test data are found in the separate individual Test Case documents.

Table 16 iBeta Sampling of System Function and Test Cases

iBeta Sampling of System Function	Test Case
a. Ballot Preparation Subsystem	Regression System Level, Volume 11 & 12
b. Test operations performed prior to, during and after processing of ballots, including:	
i. Logic Test – Interpretation of Ballot Styles & recognition of precincts	Regression System Level M100 Volume 1 & 2
ii. Accuracy Tests- Ballot reading accuracy	Regression System Level M100 Volume 1, 2, 4, 11, & 12
iii. Status Tests- Equipment statement &memory contents	Regression System Level M100 Volume 1, 2, 4, 11, & 12
iv. Report Generation – Produce test output data	Regression System Level M100 Volume 1, 2, 4, 11, & 12
v. Report Generation- Produce audit data	Regression System Level M100 Volume 1, 2, 4, 11, & 12
c. Procedures applicable to equipment used in a Polling Place for:	
i. Opening the polls, accepting & counting ballots	Regression System Level M100 Volume 1, 2, 4, 11, & 12
ii. Monitoring equipment status	Regression System Level M100 Volume 1, 2, 4, 11, & 12
iii. Equipment response to commands	Regression System Level M100 Volume 1, 2, 4, 11, & 12
iv. Generating real-time audit	Regression System Level M100 Volume 1, 2, 4, 11, & 12
v: Closing polls and disabling ballot acceptance	Regression System Level M100 Volume 1, 2, 4, 11, & 12
vi. Generating election data reports	Regression System Level M100 Volume 1, 2, 4, 11, & 12

iBeta Sampling of System Function	Test Case
vii Transfer ballot count to central counting location	Regression System Level M100 Volume 1, 2, 4, 11, & 12
viii Electronic transmission (Negative test: no modem present)	Telephony & Cryptographic
d. Procedures applicable to equipment used in a Central Count Place	
i. Process ballot deck for >1precinct	Regression System Level M100 Volume 1, 11 & 12
ii. Monitoring equipment status	Regression System Level M100 Volume 1, 11 & 12
iii. Equipment response to commands	Regression System Level M100 Volume 1, 11 & 12
iv. Integration with peripherals equipment or other data processing systems	Regression System Level M100 Volume 1, 11 & 12
v. Generating real-time audit messages	Regression System Level M100 Volume 1, 11 & 12
vi. Generating precinct-level election data reports	Regression System Level M100 Volume 1, 11 & 12
vii. Generating summary election data reports	Regression System Level M100 Volume 1, 11 & 12

4.4.5 System Level Test Case Design

The majority of functional tests are being executed as mock elections in an end-to-end system level test (see section 4.4.4). They have been prepared to assess the response of the hardware and software to a range of conditions.

Detailed information for the tests is included in the corresponding Test Method contained in Section **7.** All of these test cases or reviews identify Accept/Reject performance criteria for certification based upon the VSS 2002 and the Unity 3.2.1.0 voting system software, hardware, security and specifications. Detailed test steps and test data are found in the separate individual Test Case documents.

Table 17 System- Level Test Cases

	Test Cases
a. Volume Test	
Using the ES&S defined Unity 3.2.1.0 system limitations for the M100 confirm the estimated maximum of the largest ES&S customers exceeds the customer maximums. Document in the test case the percentage that the system limit exceeds the customer maximum. (System Limit * 100) /Customer Maximum =% System Limit) Using the ES&S defined M100 system limit, verify that the maximum capacity is successfully prepared and processed without errors for: Vol. 1) The maximum number of paper ballot styles within an election. Vol. 2) The maximum number of ballot styles in a precinct Vol. 4) See below (g. Recovery Tests) Vol. 11) The maximum number of precincts in an early voting location Vol. 12) The maximum number of precincts in a polling place on election day	M100 Volume 1, 2, 4, 11, 12 (Volume)
b. Stress Test	
Using the ES&S defined system limits for the M100, verify that the voting system provides an appropriate response to an overloading condition, exceeding: Vol. 1) The maximum number of paper ballot styles within an election. Vol. 2) The maximum number of ballot styles in a precinct Vol. 4) See below (g. Recovery Tests) Vol. 11) The maximum number of precincts in an early voting location Vol. 12) The maximum number of precincts in a polling place on election day Stress scenarios exceeding the maximum limitations will be executed to confirm any applicable error handling: If error messages are generated they are: - Stored & reported as they occur - Errors requiring intervention clearly display issues & action instructions or with indicators - Incorrect responses will not lead to irreversible errors. If error messages are not generated:	M100 Volume 1, 2, 4, 11, 12 (Stress)

	Test Cases
- The system processes without error; or - If there are any system errors then the system shall recover without any loss of data.	
c. Usability Tests:	
Election database and ballots will be prepared, installed, voted and reported exercising the input controls, error content, and audit message content of the voting system. • A review will assess the content and clarity of instructions and processes.	M100 Reuse System Level M100 Reuse Characteristics M100 Volume Tests 1, 2, 4, 11, 12 (Error Recovery)
d. Accessibility Tests:	
An audio Spanish and English ballot will be programmed. Votes will be marked on the VAT to confirm: • Ballots can be accessed visually, aurally or with non-electronic dexterity aids in Spanish and English • Ballots can be accessed with various screen contrast, ballot display settings, and required audio ballot controls • Physical aspect measurements of the voting system will comply with the VSS 2002	Regression System Level
e. Security Tests:	
During system level testing steps will be incorporated into the pre-vote, vote, and post vote election phases. These steps shall test: • Security access controls limit or detect access to critical systems for ballot preparation in the peer-to-peer and client/server EMS local area network • Security access controls limit or detect access to critical systems for ballot installation, poll opening/closing, ballot activation, transfer of data, reporting of results and audit functions of the M100 • Loss of system integrity, availability, confidentiality and accountability are detectable on the M100 • The effectiveness of the documented security polices and procedures	Regression System Level Security Test Case (Windows Hardening Test Steps peer-to-peer& Client/Server)
M100 security specific test cases shall include: • Attempts to circumvent user sign in and insert media to circumvent sign in • Methods to bypass or defeat the security • Denial of service attacks simulated • Poll workers, and voters as threat agents to access the ability of the system to resist or detect attacks, log and/or report attempts • Effectiveness of the documented security polices and procedures (The details for these high level test objectives are found in the section 7 Security Test Method)	Security Test Case
Telephony test cases shall include: • Confirmation that the system doesn't access the public telephone network	Security, Telephony & Cryptographic Test Cases
After defining language specific review criteria, a software source code review will be executed to confirm that: • Modules contain single exit points • There are no unbound arrays • There are no vote counter overflows • Audit records log errors & events • There is separate and redundant ballot image, vote and audit recording • Voting systems halt execution at the loss of critical systems • There are no computer-generated passwords	M100 iBeta 3% Source Code Review Assessment and the SysTest' Source Code Review
f. Performance Tests:	
During various functional and accuracy testing the elections will be programmed, voted and tallied to ensure ballot formats are accurately displayed, votes are accurately and reliably cast for the voting variations and functionality supported by the voting system.	M100 Reuse System Level Regression System Level
High or overloaded volume processing, storing and reporting shall occur without system degradation on the M100.	M100 Volume 1, 2, 4, 5, 11, & 12
g. Recovery Tests:	

	Test Cases
Consistency assessment of Source Code to confirm that the single exit point is the point where control is returned. At that point, the data that is expected as output is appropriately set. The exception for the exit point is where a problem is so severe that execution cannot be resumed. In this case, the design explicitly protects all recorded votes and audit log information and implements formal exception handlers provided by the language	Source Code Review v.1:4.2.3.e
iBeta examined the power recovery test case and results provided by SysTest to determine sufficiency for incorporation of results into the iBeta testing to determine the system is able to: • Recover from power or other system failure, without loss of vote data; and • Be supported on back up power for a minimum of two hours.	M100 Volume 5 (Reuse Electrical Supply)
On the M100: Vol. 1) The maximum number of paper ballot styles within an election Vol. 2) The maximum number of ballot styles in a precinct Vol. 4) The maximum media capacity Vol. 11) The maximum number of precincts in an early voting location Vol. 12) The maximum number of precincts in a polling place on election day If during Volume and Stress testing there are system errors that cause a crash the system shall recover without any loss of data	M100 Volume 1, 2, 4, 5, 11, & 12

4.5 Security Functions

A security documentation review in accordance with VSS 2002 Vol. 2 Sect. 6.4 was completed and documented in the *FCA Security Review and Test Method*. Based upon the assessment of the security documents and findings of this review specific security tests were identified and recorded in the same document to meet the requirements of Vol. 1 Sect. 6. The review was either conducted or peer reviewed by an iBeta CISSP staff member. Based upon this review specific security tests, source code and/or document reviews were defined. These were then incorporated into the security test contained in section 7.

In addition to the review of the ES&S security documentation, Vol.2 Sect. 1.5 states VSTLs "shall expand tests used for system security to address the threats that are applicable to a particular design of voting system." In order to assess if new threats were identified that would require tests to be added to the current iBeta security testing, iBeta examined reports submitted to the EAC Clearing House. It should be noted that material submitted to the EAC Clearing House covers a broad range of election topics unrelated to voting system testing or security. . In reviewing each document the first assessment was to determine if the document was relevant to security threats. The assessment findings were recorded. Reports and issues were identified as "Non-Issue", "Duplicate", "General Issue" and "Individual Assessment". "Non-Issues" or "Duplicates" were did not impact testing. Items identified as "General Issue" or "Individual Assessment" further examined for inclusion in security testing. The examination record identified the report, the voting system, a description of the report and/or threat, an assessment with rationale, if the report was in the scope of the VSTL, if it was contained in current testing, the voting standard requirement and actions to take based upon the review.

Items identified as:
- Non-Issue included transmittals, cover letters, procedures/reports that do not identify "threats that are applicable to a particular voting system design"
- Duplicate reports were noted without further assessment.
- General Issue included broadly worded reports that were currently covered in the standard VSTL test cases
- Individual Assessment included procedures/reports that identify "threats that are applicable to a particular voting system design" where specific details are signicant to the assessment of the threat

Items which were applicable to the Unity 3.2.1.0 voting systems included:
- Tampering with the voting system to block & swap votes (CT-10/1/06 & 7/1/07)
- Multiple simultaneous key presses close the polls (CT 7/1/07)
- Screen recalibration is a protected function (NY 7/12/07)

- Protections when re-importing results from the same card (NY 7/12/07)
- Any manual input of votes at the central count requires authentication and username logging (NY 7/12/07)
- Testing of serial ports incorporating appropriate buffer overflows and input-based attacks (NY 7/12/07)
- Testing for vulnerabilities in the boot sequence of systems (NY 7/12/07).
- Ballot cannot be scanned once the M100 PCMCIA cards are set write-protect (NY 7/12/07).
- Attempts to load M100 Firmware via the PCMCIA card slot. (NY 7/12/07).
- Attempt to modify a PCMCIA card with votes and load into ERM. (NY 7/12/07)

4.6 TDP Evaluation

The PCA Document Review (volume 1 section 9.6.1.2.b) is conducted to confirm the completeness and clarity of the documents. This is part of the Pre-Certification Test to the VSS 2002 volume 2 section 2 requirements. All activities and reported results are contained above in sections 2.1.2 through 2.1.2.3.

The TDP is used to develop and execute the test plan, test methods and test cases for the purposes of confirming that the configuration and operation of the system conform to the submitted documentation (Vol. 1 Sect. 9.6.2.1.f). Documented access control policies, procedures and system capabilities are evaluated to identify and verify the features implementation (Vol. 2 Sect. 6.4.1). Review of test procedures and results are performed to determine if the vendor's functional requirements have been tested (Vol. 2 Sect. 6.7). The results of these reviews are used to prepare test plan sections 2.0 through 2.1.1.3, 2.1.4 through 2.1.4.3, 4 and 7.

If during the evaluation of the TDP it is found that the documentation does not address or conform to the requirements of the VSS 2002, a document defect is noted in the *ESS Unity 3.2.1.0 PCA and FCA Discrepancy Report.* All defects must be addressed by ES&S and verified by iBeta prior to completion of certification testing.

4.7 Source Code Review

The PCA Source Code Review VSS 2002 requirements (Vol. 1 Sect. 4.2.2 through 4.2.7, 6.2 and 6.4.2; and Vol. 2 Sect. 2.5.4.d and 5.4.2) are part of the Pre-Certification Tests. All activities and results are contained above in sections 2.1.3 through 2.1.3.3.

Following the completion of the PCA Source Code Review iBeta initiated Trusted Builds to ensure that the certification executable release is built from the tested components. These builds included the changes to ERM v.7.5.5.0 from the Unity 3.2.0.0 baseline (ERM v.7.5.4.0) and the Unity 3.2.1.0 baseline M100 v.5.4.1.0. These builds followed the same process as the Trusted Builds of the unmodified Unity 3.2.0.0 applications. Detailed documentation of the Trusted Build process is contained in Appendix G of the Unity 3.2.0.0 Test Report.

During the review of security documentation iBeta identifies any security functions that are best validated by reviewing the source code. The source code review in this instance is a separate review that is detailed and recorded in the *FCA Security Test Case*.

4.8 QA & CM System Review

As there were no changes to the ES&S Unity 3.2.0.0 Quality Assurance and Configuration Management documentation, no additional review was required in Unity 3.2.1.0. A test staff aid is prepared that identifies ES&S version control methods to assist in assessing ES&S' compliance.

In addition to the build and installation process, iBeta observes the Unity 3.2.1.0 delivered materials, documents, hardware and software to confirm that ES&S' is consistent with their internal quality procedures and configuration management. The VSS tasks the VSTL with this observation during testing. iBeta shall deem that ES&S follows their policies if no inconsistencies are identified during the test effort. If any inconsistencies are identified by iBeta, they shall be noted on the *ESS Unity 3.2.1.0 PCA and FCA Discrepancy Report* as informational.

5 Test Data

5.1 Test Data Recording
The results of testing and review to the ES&S Unity 3.2.1.0 voting system to the VSS 2002 are recorded in the test case and review forms prepared by iBeta. Environmental test data will be recorded in the manner appropriate to the test equipment with output reports detailing the results and analysis. An iBeta observer record of the test execution shall also be maintained in a test case. 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 ES&S Unity 3.2.1.0 voting system TDP, and the requirements of the VSS 2002. The ES&S Unity 3.2.1.0 voting system shall be evaluated for its performance against the standard and the expected results identified in each test case.

Test cases shall identity the election and ballot inputs on the Test Data and Ballot Data spreadsheet tabs. Vote inputs shall be identified on the Vote Data spreadsheet tab. Outputs shall be verified against the Test Step 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

The test location of the Functional, System Level, Accessibility, Usability and Environmental testing is identified in the Unity 4.0 Summary Test Report. All iBeta software testing and review will be performed at iBeta's laboratory in Aurora, Colorado. An additional ESD test shall be conducted on the M100 at the facilities of sub-contractor Criterion Technologies, Inc. Rollinsville, Colorado.

ES&S Unity v.4.0 test documentation will be maintained by SysTest, as directed by the EAC.

The ES&S Unity 3.2.1.0 documentation, test documentation and results will be maintained in the ES&S Unity 3.2.1.0 voting system project folder on the SharePoint server in the Voting business vertical repository. Reviews and testing reused from Unity 3.2.0.0 baseline shall be maintained in that project folder and the iBeta voting project archive. Only project assigned test personnel will have access to the ES&S 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 3.2.1.0 voting system test platform will be set-up in the manner identified in the system configuration identified in the *Hardening Procedures for the Election Management System PC* and the M100, DS200, M650 and AutoMARK VAT hardware specification. The test platform will be documented. Installation of the unmodified EAC certified Unity 3.2.0.0 applications and the M100 and ERM trusted builds will be observed and documented. An inventory of any accessories or preloaded applications will be documented. Conditions necessary to reproduce the test set up are contained in the applicable test cases and *PCA Configuration Unity 3.2.1.0* document.

6.3 Test Sequence

There is no required sequence for performing system qualifications tests and audits. (Vol. 1 Sect. 9.4.2) PCA, FAC and other test may be schedules in any convenient order provided the prerequisite conditions have been met. Table 5 identifies test tasks and their prerequisite conditions.

6.4 Test Operations Procedures

Test cases and review criteria are contained in separate documents. They are provided to the iBeta test staff and Environmental Hardware Subcontractor 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 VSS 2002.
- **Reject:** the expected result of the test case is not observed; an element of the voting system did not meet the VSS 2002.
- **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 on the Discrepancy Report. Issue types include:

- Document Defects: a documentation element of the voting system did not meet the VSS 2002. Resolution of the defect is required for certification.
- Functional Defects: a hardware or software element of the voting system did not meet the VSS 2002. Resolution of the defect is required for certification.

- Informational: an element of the voting system which meets the VSS 2002 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. Steps necessary to reproduce the test results are contained in the Test Case documents. Test operation personnel and their assignments are identified in Table 5.

7 Test Operation Procedures

The Test Operation Procedures include the Test Methods which are prepared for each Test Case. Test cases are separate documents.

7.1 *System Level Test Methods*

A Test Method specifies what is to be tested in a Test Case.

7.1.1 Reuse and Regression System Level Test Methods

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
Test Case Name	**Reuse of SysTest System Level Test Method**	Regression System Level Test Case
Scope - identifies the type of test	Reuse System Level : SysTest Unity v.4.0.0.0 Test Cases applicable to the scope of Unity 3.2.1.0: Readiness, Functional, Maintainability, GEN01, GEN02, GEN02 PA, GEN03, PRI01, PRI01 PP, PRI02, 40HTEST1, Ohio Test, 40HTEST3, 40HTEST4, 40HTEST5, 3000 Precincts, Error Recovery, and Electrical Supply	The scope is to test, create and tally the election on a Windows 2003 server based network (multiple PCs) set up, and a regression system level test incorporating validations of a substantial portion of the VSS 2002 required and vendor identified functionality for the Unity 3.2.1.0 voting system. Pre-vote: Create a Pick-a-Party Primary election; prepare election media and paper ballots in EDM, ESSIM and HPM; import into AIMS. Vote: Vote Election Day hand & machine marked paper ballots (VAT:A100 & A200); precinct scanning (DS200 and M100) Post Vote: Write election results (DS200 and M100); scan absentee hand marked and VAT marked ballots (M650 central scanner); consolidate absentee & Election Day votes into ERM for tallying and reporting. Testing includes validation of measurable performance including accuracy, processing rate, and ballot format handling capability, incorporating: The test case will have 2 scenarios. Both scenarios will use the same election however, 1 change will be made. Changing the HPM System Type for discrepancy 20.
Test Objective	ES&S has petitioned the EAC for reuse of the applicable components in scope for Unity 3.2.1.0 from the SysTest testing of the Unity v.4.0.0.0 certification test effort. Determination of reuse of test results for functional, system level, usability, and accessibility testing performed by SysTest validating the VSS 2002 required and ES&S identified functionality for the Unity 3.2.1.0 voting system is identified in Appendix C.	The objective is to validate the ability to store and tally an election on a Windows 2003 server based network configuration, and: - Accurately and securely create paper English and Spanish visual and audio ballots for a pick-a-party primary election; - Create and install election specific media for the VAT and DS200, M100 and M650; - Independently and securely vote audio and visual ballots with mobility and non-mobility restrictions; - Count and report the results and; Validate identified discrepancies: - Discrepancy #7 - M100 accepted ballots that were copied from un-voted original ballots on a laser color copier printer - Discrepancy #9 - Create 4 groups (1- M100, 2- DS200, 3 - M650, 4 - M650 A). After creating the groups go back and switch the location of the M650 group and the M100 group.

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
		- Discrepancy #20 - In HPM when the System Type is set to the "Mixed" option in an election that is all Scanner (M100, DS200 & M650), an error is generated in ERM when creating results database - Discrepancy #20 - In HPM when the System Type is set to the "Central Count" option in an election that is only using an M650 Central Scanner, an error is generated in ERM when creating results database.
Test Variables: Voting Variations (as supported by the voting system)	Determination by the EAC of the reuse of SysTest testing, test results and test reporting for Ballot-on-Demand (BOD), VAT and tabulators (M100), for Unity 3.2.0.0 from the SysTest testing of the Unity v.4.0.0.0 certification test effort.	In Scope for Unity 3.2.1.0: Wisconsin Open Pick-a-Party Primary comprising: - An 14 inch combined paper ballot containing Dem, Rep & Non-Partisan selections, with ovals on the right side - 1 Polling Place - 2 Ballot Styles comprising: Ballot Style 1: 1000, 2000, 3000-02, Ballot Style 2: 3000-01 - 3 Precincts (1000, 2000, 3000) splits (3000-01, 3000-02) - 2 Partisan, 1 Non-Partisan, 1 Referendum Contests & a Party Selection Discrepancy #20 - In HPM select "Mixed" to read in all types of election media into ERM. Election Day voting (VAT, M100 & DS200), Absentee Voting (M650) Vote for 1, Vote for N of M, Write-in votes (all contests) Assistive Devices (AT paddles, tactilely discernible keypad, Audio\Visual ballots) Multi-lingual Audio & Visual Ballots (English & Spanish) - Create all Spanish translations in EDM: modify Democrat part WAV files for Spanish and English & create WAV audio file recorded in AIMS - VAT alerts (set in AIMS) ballots Overvoted and Undervoted - DS200 and M100 Ballot Control Options (HPM): Query: Overvotes, Crossover, and Blank ballots; Reject: Unreadable marks; Accept: undervote. - M100 - Diverter Installed to divert Blank and Write-in ballots in ballot box
A description of the voting system type and the operational environment	See Appendix C	The Unity 3.2.1.0 EMS includes a Windows 2003 server based network.
VSS 2002 vol. 1	2.2.1 thru 2.2.9, 2.2.11 thru 2.5.3.2, 2.5.4, 3.2.4 thru 3.2.4.2.1, 3.2.4.2.3, 3.2.4.2.5, 3.2.4.2.6, 3.2.5 thru 3.2.6.1.2, 3.2.7 thru 3.2.8.2 HAVA a thru c2 RFI: 2007-02, 2007-04, 2007-06, 2008-04, 2008-07, 2008-12	2.2.1 thru 2.2.9, 2.3.1.1 thru 2.5.3.2 , (DRE requirements applicable to VAT excluding vote storage) 3.2.4.2.5, 3.2.4.2.6, 3.2.5.1.3 a thru d.4, 3.2.6.1.1, 3.2.8 thru 3.2.8.2 HAVA a thru c2 RFI: 2007-04, 2007-06, 2008-04, 2008-07, 2008-12
VSS 2002 vol. 2	6.2, 6.2.1, 6.2.2, 6.3, 6.4, 6.4.1, 6.5, 6.6, 6.7 RFI: 2007-06, 2008-07, 2008-12	6.2, 6.2.1, 6.2.2, 6.3, 6.4, 6.4.1 , 6.5, 6.6, 6.7 RFI: 2007-06, 2008-07, 2008-12

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
Hardware, Software voting system configuration and test location	Determination by the EAC of the reuse of SysTest testing. Configuration of SysTest See Appendix C	EMS Software: EMS Ballot Preparation SW: Audit Manager (AM), Election Data Manager (EDM), ES&S Image Manager (ESSIM), Hardware Programming Manager (HPM), AutoMARK Information Management System (AIMS), Election Reporting Manager (ERM), LogMonitor Service Hardware: (4) Ballot Marking Device: Voter Assist Terminal (VAT), Models A100 (1) & A200 (3) (1) Precinct Count scanner/tabulator: intElect DS200 (DS200 w/plastic ballot box) (1) Precinct Count scanner/tabulator: Model 100 (M100 w/ steel ballot box with diverter) (1)Central Count scanner/tabulator: Model 650 (M650) (1) File Server (1) PC for Unity EMS applications (1) PC for AIMS (3) PCs for ERM (1) Network Printer (1) Network hub/switch Test Location: iBeta, 3131 S. Vaughn Way, Aurora, CO 80014
Pre-requisites and preparation for test case execution	See Appendix C	Prior to execution of testing, the following prerequisites must be completed: - Record the testers & date - Perform and install witness/trusted build of software/firmware components utilizing ES&S documentation - System has been installed and set up as identified in the user manuals - Gather any necessary materials or manuals (A microphone, PC soundcard and speakers are available/installed to record audio, white and blue blank ballot stock paper) - Ensure customization of the test case template is complete
Getting Started Checks	See Appendix C	**Check the voting system to:** - Verify the test environment and system configuration is documented in the PCA Configuration matches the configuration of 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 will be performed. - The environment is set up with a Windows 2003 server based network. (Configuration is as follows: 1 PC for Unity ballot prep. software, 1 PC for AIMS, 3 PCs for ERM, 1 network printer, 1 file

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
		server, Network hub/switch, 1 M100 steel ballot box with a diverter and 1DS200 plastic ballot box-returned from hardware test lab)
Documentation of Test Data & Test Results	See Appendix C	Test Data: - 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. Test Results: - 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 number in the Comments
Pre-vote: Ballot Preparation procedures verifications	See Appendix C	Ballot Prep: Verify (RFI: 2007-04, 2008-04, 2008-07) - Spanish/English, visual/audio ballots (contests, candidates, propositions and associated offices/labels) can be accurately/securely defined with multiple ballot styles, precincts and splits. In EDM change: Ballot Sets/Ballot Style ID - By Precinct Add a Party - enter: 4 (Order), XVR (ID), 3 (Device), Crossover (Party Name) - Ballots contain partisan races segregated by party and non-partisan races (Dem, Rep, Non-Partisan) - Ballots contain identifying marks (ballot style, precincts/splits) - Ballot & VAT: ovals properly align with candidate names/issues so voters can clearly mark selections; spacing and font size is consistent so there is no preferential voting position - VAT: maximum choices for a single contest are displayed on one page - The election can be accurately/securely imported from Unity 3.2.1.0 into AIMS. (Prerequisite: define and print ballot in Unity 3.2.1.0, before importing into AIMS.) - The AIMS database can be modified, as required, to support the election definition required for VAT operation; and using AIMS Preview function confirm data was imported correctly and ballots are set up correctly. - Election media can be accurately/securely programmed in HPM and AIMS for installation in all voting & tabulating devices. (VAT, DS200, M650) - Verify audit logs for AM, EDM, ESSIM, HPM and AIMS for message IUImport - Performed full Unity election import. - Verify audit logs for status/error messages: EDM: Minimum password length is 6 characters, District Type Name can not be blank, ESSIM: Please Enter a Style Sheet Name, HPM: Admin password is required Installation of Election - Insert a blank CF card, turn to ON position and verify system will not

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
		boot up without an election definition. - Insert a CF card with an election, turn to ON position and verify self-test is successful and VAT displays "Please Insert Your Ballot" - VAT: Setup; perform maintenance checks: ink cartridge, Battery charge, Install Flash Memory Card, Test VAT operations, Set Admin password, Calibrate, Set 'Maint' password to confirm there are no hardware/software failures - DS200, M100 & M650: Setup & install election; set Date & Time; and perform readiness tests **Scenario 1:** HPM System Type is set to "Mixed" **Scenario 2:** HPM System Type is set to "Central Count" for the M650 tally only.
Pre-vote: Ballot Preparation Security	See Appendix C	Ballot Prep: -Security access controls limit or detect access to critical systems and the loss of system integrity, availability, confidentiality & accountability, - ID and password can be defined for EDM, ESSIM & AIMS. (Use newly created id/password during Pre-Vote activities.) - Password required to start AIMS - Password required to access EDM - Verify access is permitted and denied without proper credentials for each of the systems -Functions are only executable in the intended manner, order & under intended conditions -Prevents execution of functions if preconditions weren't met -Implemented restrictions on controlled functions - Documentation of mandatory administrative procedures. COTS -Authentication is configured on the local terminal & external connection devices, -Operating systems are enabled for all session & connection openings, & closings, all process executions & terminations & for the alteration or detection of any memory or file object -Configure the system to only execute intended & needed processes during the execution election software. Processes are halted until termination of critical system processes (such as audit).
Readiness Testing and Poll Verification	See Appendix C	Readiness Testing: Verification that: VAT: Proper election has been installed: all buttons, printers and screen function correctly; matching version is displayed; and a ballot can be marked in test mode. - Review audit logs to confirm readiness for VAT - Prevents execution of functions if preconditions weren't met VAT: Verify A password is required to access the System Maint menu DS200, M100 & M650: Readiness testing automatically incorporated into Opening the Polls; Election name, equipment identification, polling place & ballot format and matching version is displayed or printed on

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
		initial state report and/or zero count report; confirmation that there are no hardware/software failures ; and device is ready to be activated to accept votes. Perform readiness testing according to VSS requirements - Obtain status, data reports, audit logs and other artifacts to confirm readiness - Attempt to open polls with test totals. Verify a visual screen warning is provided if memory locations contain votes, and the reports/audit log contain a time-stamp record of the status of the votes/results memory and disk storage locations. If a unit or system contains a non-zero counter, a warning message is provided, along with corrective actions to resolve the votes. The unit is disabled until type of resolution is selected. Clear totals on the M100 and the DS200 only. DS200: Verify A password is required to access the Admin menu and to reopen polls M100: Verify A password is required to reopen the polls and access additional reports Read in the M650 test results into ERM. Do not clear totals at this time.
Pre- vote: Opening the Polls Verification	See Appendix C	Precinct Count: - DS200 select 'Open Polls". Zero report will automatically print, an internal test will be performed and results will display. If test is unsuccessful, DS200 will automatically shut down; If successful will display "Please Insert Your Ballot" message Paper based: Verify VAT, M100 & DS200 are ready for use: - VAT & DS200 display "Please Insert Your Ballot" message. - Any failures provide a message for resolution - VAT holds the ballot securely - DS200 & M100 do not contain a frame or fixture for ballot marking - DS200 is attached to a custom DS200 plastic or metal ballot box; with locks and separate compartments; slots prevent unauthorized ballot insertion. Write-ins will be marked with a red circle to indicate review is necessary - M100 is attached to a custom M100 metal ballot box; with locks and separate compartments; slots prevent unauthorized ballot insertion. - VAT security seals are checked: compact flash compartment, top cover & ink compartment
Voting: Ballot Activation and Casting Verifications	See Appendix C	Verify (RFI: 2007-06, 2008-12) **VAT, M100 & DS200** Protects secrecy of ballot/vote - Voter can make selections based on ballot programming & indicate selection, cancellation, & non-selection (undervotes) - Gives feedback & an opportunity to correct or accept, before the ballot is counted - Functions are only executable in the intended manner, order & under

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
		intended conditions - Prevents execution of functions if preconditions weren't met **VAT** - Control of ballot (single ballot cast per vote session) and content of ballot is restricted to the eligible voter - Correct ballot is presented (language, audio/visual, precinct/split) - Party affiliation content is controlled/activated via the "Party Preference" - Touching an area outside the identified selection box does not mark the ballot or display external information - Provides all displays, instructions, messages, alerts and status in multilingual audio & visual displays - Voters are able to edit and review write-ins. # of write-ins match Vote For. - Audio voting provides repeat functionality & volume control - Voter is allowed to mark the ballot, in any combination, or return it without marking (blank) - Overvote and Undervote provides alerts, with overvotes prevented - Summary screen is provided to signify end of candidate/measures and provides instructions to review/change selections prior to ballot marking - Verify alert of selection's complete, ballot is being marked, and to take completed ballot to tabulator **DS200 & M100** - Alert successful/unsuccessful storage of cast ballot; provide review & instruction to resolve unsuccessful casting (Query: Overvotes, Crossover, and Blank ballots; Reject: Unreadable marks; Accept: undervote. - Increments the ballot counter for successfully cast ballots - Print Precinct and Status reports to compare to vote data to verify actual votes cast is correct & undervotes/overvotes are counted separately - Access to voted ballot is prevented until after polls close (locked ballot box) **M100:** - External printer is connected, becoming the default printer for reports - Diverter Installed to divert Blank and Write-in ballots in ballot box - **Clearinghouse CT 7/1/07:** Verify that simultaneously pressing 2 buttons will not cause the polls to close **Discrepancy 7:** photocopied ballots are rejected by the M100
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	See Appendix C	The system audit provides a time stamped, always available, report of normal/abnormal events that can't be turned off when the system is in operating mode. - Maintain accurate and complete audit records; verify at various points (After poll open; vote query, reject & accept: any abnormal event encountered in testing; poll close)

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
		- Self-tests and diagnostic messages for the hardware will be verified at poll open/close points in the test case Status messages are part of the real time audit record. - Critical status messages requiring operator intervention shall use clear indicators or text Error messages are: - Generated, stored & reported as they occur - Errors requiring intervention by the voter or poll worker clearly display issues & action instructions in easily understood 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.
Post-vote: Closing the Polls	See Appendix C	VAT: - Turn VAT to 'Off' position & remove FMC to prevent further casting of ballots; verify a voting session cannot be activated. - Review the audit logs (only available report) to verify entries are in the proper sequence for operational tests, switching from test to vote modes, ballot printing, audit report access during voting , including complete & accurate error and status messages **DS200 & M100:** - Attempt to print reports while polls are open; verify this is prohibited. - Close the polls and a Results Report will print preventing further casting of ballots (attempt to scan a ballot without reopening the polls) - Visibly displays the status "Polls Closed" - Internally tests and verifies that the closing procedures have been followed and the device status is normal by preventing report printing or processing vote totals unless polls were properly closed. - Confirm polls cannot be reopened without password - Review the audit log to verify test records exists that verify entries for the proper sequence for operational tests, poll open; vote query, reject & accept: any abnormal event encountered in testing; poll close, including complete & accurate error and status messages - Print Status report, Race Results report, Certification report, Precinct Report Summary, Poll Report Summary and Audit Log report once polls are closed. Ensure undervote & overvote is counted. - Validate data from USB/PCMCIA is extractable by transmitting results into ERM **Reopen the polls testing:** - Reopen of polls, enter an incorrect and then a correct password - Alert to resume voting or clear votes: select 'resume voting', do not clear votes - Status message "Please insert your ballot" is displayed -Cast a vote and close the polls. - Check audit for proper sequence for operational tests, poll open, vote accept, poll close, reopen, password entry

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
		- Verify correct vote totals.
Post-vote: Central Count	See Appendix C	Obtain status, data reports, audit logs and other artifacts to confirm readiness - M650: Verify the back door is locked - Votes match predicted votes (absentee) - Geographic reports of votes; each contest by precinct & other jurisdictional levels. Reports include: Zero, Grand Totals (long format), Precincts Processed, Totals by Precinct (long format) Machine Readiness, Audit log. Ensure audit logs are accurate & complete and contain error and status messages. - Scan M650 ballots, then Scan Absentee ballots using separate media for each. **Vote Consolidation into ERM:** - **Discrepancy 20 (both scenarios)**: verify no error " "Convert Precinct Results File: The precincts results file is from older software and is being converted." And "Error: File: TC NAME.CTR, Error: #35 - File does not exist." "Is given when attempting to re-launch ERM. **Discrepancy #9** - all 4 groups are displayed. - 3 ERM PCs will be used for reading results (DS200), and viewing and reading results simultaneously (M100 and M650) - Attempt to read in vote totals with test totals present. Verify message indicating the there are totals present and a corrective action message is provided. - Admin account and password is needed in ERM System Administrator to prevent access to "Suspension Menu"; and confirm access is denied. - Geographic reports of votes; each contest by precinct & other jurisdictional levels. Reports include: - **Zero - RFI2008-07** to ensure ERM is zeroed out before processing election results. - **EL30A** - Prec Report–Group Detail individual precincts & contest results. - **EL45**- Election Summary - total number of votes for each candidate/question & % of total vote for each candidate/question - **EL111** - Name Heading Canvass - statistics of total number of precincts counted, total number of votes cast for each candidate and % of total vote received by each candidate - **EL50** - Precincts Counted - lists the identification numbers and names of your precincts the precincts that are counted by ERM. - **EL50A**, Precincts Completed Listing - list of precincts that have been completed along with their Total Ballots Cast, Total Registered Voters, and the Turnout Percentage - Audit log Consolidated reported votes match predicted votes from polling places, & optionally other sources (absentee) - Retrieve ballot images from the DS200

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
		- Data from the M100, M650 & DS200 is prevented from being altered or destroyed by report generation, or extraction from media - DS200 SN is displayed in ERM, once the USB flash drive is read into ERM
Post-vote: Security	See Appendix C	The central count: (See Security Test for detail) During execution confirm: - Security access controls limit or detect access to critical systems& the loss of system integrity, availability, confidentiality and accountability - Functions are only executable in the intended manner, order & under the intended conditions - Prevented execution of functions if preconditions were not met - Implemented restrictions on controlled functions - Provided documentation of mandatory administrative procedures. COTS systems -Authentication is configured on the local terminal and external connection devices, -Operating systems are enabled for all session and connection openings, and closings, all process executions and terminations and for the alteration or detection of any memory or file object - Configure the system to only execute the intended and necessary processes during the execution of the election software. Election software process is halted until the termination of any critical system process, such as system audit.
Post-vote: System Audit	See Appendix C	The system audit provides a central count time stamped always available, report of normal and abnormal events that cannot be turned off when the system is in operating mode. Status message are part of the real time audit record. Audit Messages to be validated: VAT: date/time set DS200, M100 & M650: Election id ERM: DS200 SN is recorded DS200, M100, M650 & ERM: Message of vote totals present, Corrective action messages to resolve residual vote totals Status/Error messages to be validated: Re-use AIMS, AM, EDM, ESSIM, and HPM audit log results from Unity 3.2.0.0 (previously certified) VAT: System Maintenance (requires password), The Flash Card has been removed. Turn OFF the machine and insert a valid Flash Card. DS200 & M100: Blank Ballot Rejected, More than one party has votes. Votes In Party Contests Will Be Ignored, Ballot Jammed, 119 – MULTIPLE BALLOTS DETECTED/Please Re-insert One Ballot After Beeps, One Contest Has Too Many Votes, Party Preference Race Missing
Expected Results are	See Appendix C	Review the test result against the expected result:

Method Detail	Reuse of SysTest System Level Test Method	Regression System Level Test Method
observed		• 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;	SysTest Unity 4.0.0.0 Test Plan identifies results validation: • Accept: expected results is observed • Reject: expected result is NOT observed • Not Testable (NT): rejection of a previous test step prevents validation of this step or this was tested in another test case • Not Applicable (NA): not applicable to the current test scope or to the component under review • Not Supported (NS): not supported in the current test scope	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. - 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.

7.1.2 Volume Test Methods (Volume Unmodified from Unity 3.2.0.0 & Volume 1)

Method Detail	Volume Unmodified from Unity 3.2.0.0 Test Method	Volume 1 Test Method
Test Case Name	Volume Unmodified from Unity 3.2.0.0 System limitations	Volume 1 - Maximum Ballot Styles for paper on the M100
Scope - identifies the type of test	To identify system limitation from 3.2.0.0 which will not require testing in Unity 3.2.1.0	The scope of this test 1639 precincts,1639 ballot styles reusing the unmodified election data created in Unity 3.2.0.0: The election data was created on a stand alone PC configuration however, the election will be loaded on a peer-to-peer configuration (multiple PCs) set up. Scenario 1) The maximum allowed number of ballot styles allowed for paper based systems (M100).
Test Objective	The objective is to identify and record the volume test cases that only impact the unmodified limits of EMS, VAT, DS200 and M650 for reuse of the test results.	The objective is to validate the ability of the M100 to process, store and report data using the allowed maximum number ballot styles with 1639 precincts within an election using a peer-to-peer configuration. iBeta will reuse the results from Unity 3.2.0.0 for exceeding the maximum numbers of ballot styles (HPM limitation and not a hardware limitation). The test is only to validate the processing, storing and reporting without system degradation. If there are system errors that cause the system to crash the system shall recover without any loss of data.
Test Variables: Volume Stress Performance Error Recovery	The EMS, VAT, DS200 and M650 system limits listed above in sections 1.4.3.1 to 1.4.3..3, and 1.4.3.5	Reuse the Volume 1 Election database from the Unity 3.2.0.0 test effort and verify the election contains the following: General Election, Election Day (M100) Partisan, Vote for 1 4 Ovals per Inch ballot - (14" ballot, 48 ovals positions per Column, 6 columns, 288 total positions) 4 candidates per contest Scenario 1) 1639 precincts with 1639 ballot styles (Maximum precincts/Maximum ballot styles) - Contests 1 - 290 in Polling Places 1 -29 (10 precincts to a polling place, 3 contest to a precinct) total of 290 ballot styles - No contest/Precincts assigned to Polling Places 30 -290 - Contests 291 - 1639 in Polling Places 291- 1639 (1 precinct to a polling Place, 3 contest to a polling place) 1348 ballot styles - Contest 1639 in Polling Place 1639 with Precincts 1639 (3 contest in the precinct, and all polling places) 1 ballot style -The election can be loaded on the M100 media.
A description of the voting system type and the operational environment	The unmodified Unity 3.2.1.0 EMS Ballot Preparation includes: Audit Manger (AM), Election Data Manger (EDM), (ESSIM), hardware Program Manger (HPM), AutoMARK Information (AIMS) 2 @ Unity 3.2.0.0 marking device: Voter Terminal(VAT) 2 @ Unity 3.2.0.0 precinct count includes: DS200 Unity 3.2.0.0 central count tabulator: Model 650 (M650) Unity 3.2.0.0 central count tally: Election Reporting Manager ERM)	The Unity 3.2.1.0 EMS includes a peer-to-peer Network: Reusing the ES&S Unity 3.2.0.0 Volume 1 election database to validate the maximum limitation of 1639 ballot styles for paper (M100 Precinct Count scanner) and using a peer-to-peer PC configuration in the EMS.
VSS 2002 vol. 1	9.5.2 Changes introduced after the system has completed qualification	2.2.5.2.2 Audit/Error messages

Method Detail	Volume Unmodified from Unity 3.2.0.0 Test Method	Volume 1 Test Method
	under these Standards or earlier versions of the national Voting System Standards will necessitate further review.	2.2.3.2.3 Audit/Status messages 2.2.3 Error Recovery
VSS 2002 vol. 2	3.2.4 Variations of System Functionality Testing to Reflect Voting Systems that incorporate Previously Tested Functionality 6.2.3 Volume (maximum number of ballot styles in an election	6.2.3 Volume (maximum number of ballot styles) A4.3.5 Volume (maximum number of ballot styles) A4.3.5 Volume/Stress (Processing, storing and reporting data when overloading the number of precincts in a Polling Place) A4.3.5 Performance/Recovery (Ballot format handling capability-graceful shut down and recovery without loss of data) A4.3.5 Performance/Recovery (Processing rates-graceful shut down and recovery without loss of data)
Hardware, Software voting system configuration and test location	The unmodified portions of the Unity 3.2.1.0 Voting System consist of the following: Audit Manger (AM), Election Data Manger (EDM), ES&S Ballot Manager (ESSIM), Hardware Program Manger (HPM), DS200, Model 650 (M650), AutoMARK Information (AIMS), Voter Terminal(VAT) The code change submitted in Unity 3.2.1.0 for the Election Reporting Manager (ERM) does not impact any system limit. All testing is performed by iBeta LLC located at 3131 S. Vaughn Way, Aurora, CO 80014.	The Unity 3.2.1.0 Voting System consists of the following: Audit Manger (AM), Election Data Manger (EDM), ES&S Ballot Image Manager (ESSIM), Hardware Program Manger (HPM), Model 100 (M100), Election Reporting Manager (ERM), AutoMARK Information (AIMS), Voter Terminal (VAT), LogMonitor 1 @ marking device: Voter Terminal (VAT) 2 @ Unity 3.2.1.0 precinct count includes: M100 2 @ Unity 3.2.1.0 central count tally: Election Reporting Manager (ERM)1 @ Hub/switch, peer-to-peer Windows XP (Professional SP3 PC) file server All testing is perform by iBeta LLC located at 3131 S. Vaughn Way, Aurora, CO 80014.
Pre-requisites and preparation for test case execution	Obtain system limitation documents for Unity 3.2.0.0 and 3.2.1.0	Complete the prerequisites: Test Method Validation: Reuse of Technical review conducted by C. Coggins; Approved 3/4/09 for validation of test method as defined in ISO/IEC 17025 clause 5.4.5; acceptance of the test method by EAC documented with issuance of EAC certification number ESSUnity3200. Successful use of the Import Wizard to import large amounts of data into EDM tested and validated: 3/18/09 in Unity 3.2.0.0 Reuse of the Election data created by the Import Wizard must be on the peer-to-peer Windows XP (Professional SP3) PC.
Getting Started Checks	**Getting Started:** Complete the prerequisites; Compare the Unity 3.2.0.0 to the 3.2.1.0 system limits to confirm the only changes is the addition of the M100	**Getting Started:** Complete the prerequisites; Check the voting system to: - Verify the test environment and system configuration is documented in the PCA Configuration and vendor described configuration. - Validate installation of the unmodified Unity 3.2.0.0 SW/FW and Unity 3.2.1.0 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. -During testing an operational readiness test was performed. - The environment is set up with a peer-to-peer configuration: 1 PC for Unity ballot preparation SW, 1 PC for AIMS, 1 PC for ERM

Method Detail	Volume Unmodified from Unity 3.2.0.0 Test Method	Volume 1 Test Method
Documentation of Test Data & Test Results	Incorporate the findings of the assessment of the system limits into the test plan, test methods and test cases. Identify the portions of the Unity 3.2.0.0 Test Report to reuse	Test Data: - 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. Test Results: - 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	Reuse of the Volume test cases 1-4, 6-10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report)	Reuse the Volume 1 Election database from the Unity 3.2.0.0 test effort and verify the election contains the following: - 4 candidates per contest - 1639 Ballot Styles - 1639 Precincts - 1639 Polling Places -An election database was accurately/securely defined & formatted using the Import Wizard. - Set up election by Style -Ballots (candidates & propositions) were accurately defined & generated. - Check EDM reports for election set up - Election media was installed - There were no system errors that caused the EMS ballot preparation applications to crash.
Volume:	Reuse of Volume test cases 1, 2, 3, 6-10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report)	System response to processing more than the expected number of ballot styles in an election. Maximum capacity is successfully processed without errors. Overloading system's capacity to process, store, and report data.
Stress	Reuse Volume 10 from 3.2.0.0 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report)	System responses to overloading conditions is generating an error in the EMS, it is not applicable to testing on the M100. Reuse results from ES&S Unity 3.2.0.0 Test report Appendix D, section 7.4.2 Volume 1 Scenario 2
Performance	Reuse Volume 1, 4, 6-10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report).	No system degradation (Ballot format handling capability and Processing rates) is observed: - When installing an election with 1639 precincts and ballot styles onto each device (M100) - The system will not slow down as more and more data is added
Error Recovery	Reuse of Volume test cases 1-10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report).	Voting system gracefully shuts down (no crash) and recovers from errors caused by overloading the number of precincts and ballots styles. - Ballot format handling capabilities and processing capabilities- graceful shut down and recover without loss of data - Critical Status Messages

Method Detail	Volume Unmodified from Unity 3.2.0.0 Test Method	Volume 1 Test Method
Readiness Testing and Poll Verification	Reuse of Volume test cases 1, 2, 7-10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report).	Verify the voting system is ready for the election: - The election is correctly installed (Election ID, polling place name, precincts) - Test data (run 2 different precincts to validate the system is ready) is segregated from voting data, with no residual effect' Test confirmation that there are: - No hardware/software failures - The device is ready to be activated to accept votes (No Identification of any failures & corrective action)
Pre- vote: Opening the Polls Verification	Reuse of Volume test cases 1, 2, 4, 6, 7, 9 and 10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report)	Verify the polling place voting system: - 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 - Key is turned to the Vote position and a message is displayed "Insert ballot"
Voting: Ballot Activation and Casting Verifications	Reuse of Volume test cases 1, 2, 4, 6, 7, 9 and 10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report).	Protects secrecy of ballot/vote - Reuse the ballots marked by the VAT during the Unity 3.2.0.0 certification effort. - Scan the ballots using the M100 (Election Day) - Vote a sample of the 1639 precincts (approximately 10%). - Vote 21 precincts each with a different ballot style - Each precinct will contain 3 contest with 4 candidates - Records selections and non-selection of individual choices for each contest - Increment the ballot counter
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	Reuse of Volume test cases 1, 2, 4, 6, 7, 9 and 10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report).	The system audit provides a time stamped, always available, report of normal/abnormal events found within the percentage of sampled test (approximately 10%). **Error messages are:** - 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 **Status Messages are:** - Displays and reports 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.

Method Detail	Volume Unmodified from Unity 3.2.0.0 Test Method	Volume 1 Test Method
Post-vote: Closing the Polls	Reuse of Volume test cases 1, 2, 4, 6, 7, 9 and 10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report)	Once the polls were closed the voting system - Printed reports of ballots counted by tabulator - Reported that votes match predicted votes from the tabulator with votes and undervotes. - Records selections and non-selection of individual choices for each contest
Expected Results are observed	Reuse of Volume test cases 1 through 10 as run in Unity 3.2.0.0 for the EMS, VAT, DS200 and M650 (See Appendix D, section 7.4.2 in Unity 3.2.0.0 Test Report)	Review the test result against the expected result: • 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;	System limitation documents for 3.2.0.0 and 3.2.1.0 shows the correct limits according to information that has been received. Any discrepancies will be logged to the appropriate Discrepancy Report	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. - 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.

7.1.3 Volume Test Methods (Volume 2 & 4 Test Methods)

Method Detail	Volume 2 Test Method	Volume 4 Test Method
Test Case Name	Volume 2 - Maximum Ballot Styles in a Single Precinct on the M100	Volume 4 - Storage Error Generation
Scope - identifies the type of test	The scope is to test the maximum numbers of ballot styles on the M100 in a single precinct. Scenario 1) The maximum allowed number of 40 ballot styles on the M100 within a single precinct. To verify that errors are generated in scenario 2: Scenario 2) Exceeding the maximum allowed number of 40 ballot styles on the M100 within a single precinct.	The Test Scope is to test: The M100 component media generate an error messages when capacity is reached without loss of data or data corruption.
Test Objective	The objective is to validate the ability to process, store and report data when using the allowed maximum number of ballot styles within a single precinct in a peer-to-peer configuration. To validate that the system generates errors during EMS ballot preparation (ballot preparation will only include the HPM since the election database was created in Unity 3.2.0.0 and being reused) when exceeding the maximum numbers of ballot styles within a single precinct. Validating the processing, storing and reporting shall occur without system degradation. If there are system errors that cause the system to crash the system shall recover without any loss of data.	The objective is to validate that the M100 provides an error messages when the PCMCIA capacity has been reached and that the PCMCIA card does not become corrupt once the error is displayed nor does the card have any loss of votes or audit log entries.
Test Variables:	Reuse the Volume 1 Election database from the Unity 3.2.0.0 test effort and verify the election contains the following: General election for each scenario 1 Precinct with 40 splits Vote for 1 & Vote for N of M Oval Positions Left Certified Write-Ins 5 contest for each ballot style 4 candidates for each contest Election day (M100) 40 Ballot Styles on the M100 Maximum ballot styles Election set up for the M100 (Reuse election files from Unity 3.2.0.0 Vol 2) Non-partisan offices one page ballot 4 Ovals per Inch ballot - (19 inch ballot, 68 ovals positions per Column, 6 columns per ballot, 408 total oval positions) Election Day Voting (M100 Scenario 1) 1 precinct with 40 Ballot Styles on the M100 Scenario 2) 1 precinct with 41 Ballot Styles on the M100	A PCB file containing an election definition is loaded on to the PCMCIA card. Using the OMNI drive's PC Card Manager program to copy the PCB file on to the PCMCIA card. The file should be near capacity of the 512 PCMCIA card (for the M100), such that it is close to having the allowable storage full.
A description of the voting system type and the operational environment	The Unity 3.2.1.0 EMS includes a peer-to-peer Network: Reusing the ES&S Unity 3.2.0.0 Volume 2 election database to validate the maximum limitation of 40 ballot styles for paper (M100 Precinct Count scanner) and using a peer-to-peer PC configuration.	The test will only include the M100

Method Detail	Volume 2 Test Method	Volume 4 Test Method
VSS 2002 vol. 1	• Same as Volume 1 - Maximum Ballot Styles for paper on the M100	2.2.5.2.2 System Audit Error Messages 2.2.5.2.3 System Audit Status Messages
VSS 2002 vol. 2	• Same as Volume 1 - Maximum Ballot Styles for paper on the M100	A4.3.5 Performance/Recovery (Processing rates-graceful shut down "no system crash" and recovery without loss of data) A4.3.5 Stress (system response to overloading data on hardware media)
Hardware, Software voting system configuration and test location	• Same as Volume 1 - Maximum Ballot Styles for paper on the M100	The Unity 3.2.1.0 Voting System consists of the following: 1 @ Model 100 (M100) All testing will be performed by iBeta LLC located at 3131 S. Vaughn Way, Aurora, CO 80014.
Pre-requisites and preparation for test case execution	• Same as Volume 1 - Maximum Ballot Styles for paper on the M100	Complete the prerequisites; Test Method Validation: Technical review conducted by C Coggins Approved 9/18/09 for validation of test method as defined in ISO/IEC 17025 clause 5.4.5. Condition of approval - iBeta validates component media is populated to near capacity prior to test execution by viewing the file size using a PC
Getting Started Checks	**Getting Started:** Complete the prerequisites; Check the voting system to: - Verify the test environment and system configuration is documented in the PCA Configuration 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. - The environment is set up with a peer-to-peer configuration. (Configuration is as follows: 1 PC for Unity ballot prep. software, 1 PC for AIMS, 1 PC for ERM)	Check the voting system to: • Same as Volume 1 - Maximum ballot styles for paper except for the environment. The environment is set up with a Peer to Peer configuration with the OMNI drive's PC Card Manager program.
Documentation of Test Data & Test Results	Test Data: - 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. Test Results: - 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.	Test Data: - Same as Volume 1 - Maximum ballot styles for paper on the M100
Volume: Paper-based voting systems Processing	Reuse the Volume 1 Election database from the Unity 3.2.0.0 test effort and verify the election contains the following: **Scenario 1** maximum limits:	Test Data: - Election media can be installed - There are no system errors that cause the M100 to crash.

Method Detail	Volume 2 Test Method	Volume 4 Test Method
	1 Precinct Vote for 1 & Vote for N of M 19 inch ballot 5 contest for each ballot style 4 candidates for each contest -Election day (M100) - 40 Ballot Styles on the M100 (M100 Maximum ballot styles) allowed in a single precinct - Election set up for the M100 - 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. **Scenario 2** Exceeding limits: - 41 Ballot Styles on the Test execution of Scenario 2 is expected to stop at this point with errors generated prior to the creation of election media in ballot preparation, however, if no error is displayed continue with the election and verify the application(s) do not crash or have any loss of data. If an error/status message is given, check audit logs messages. Test stops unless system does not error and creates media	
Volume:	Same as Volume 1 - Maximum Ballot Styles for paper on the M100; except - The system responds to processing more than the expected number of ballot styles in a single precinct	Not Applicable (only testing for error generation of full media on hardware)
Stress	System responses to overloading conditions. Exceeding the maximum allowed number of ballot styles in a single precinct.	Not Applicable (only testing for error generation of full media on hardware)
Performance	Same as Volume 1 - Maximum Ballot Styles for paper on the M100; except -When installing an election with 1 precinct and over the maximum number of ballot styles for a give device	No system degradation (Ballot Processing rate): - On the M100 with a large amount of data filling up the media storage the system will not be observed to slow down throughout the testing
Error Recovery	Same as Volume 1 - Maximum Ballot Styles for paper on the M100; except - the errors are caused by overloading the number ballots styles per precinct.	The systems should not error or crash. - If the application does error the system shall provide a clear description of the problem.
Readiness Testing and Poll Verification	Same as Volume 1 - Maximum Ballot Styles for paper on the M100; except - Test data (run 2 different ballot styles within a precinct to validate the system is ready) is segregated from voting data, with no residual effect')	Not Applicable (only testing for error generation of full media on hardware)
Pre- vote: Opening the Polls Verification	Same as Volume 1 - Maximum Ballot Styles for paper on the M100	-Same as Volume 1 - Maximum ballot styles for paper
Voting: Ballot Activation and Casting Verifications	Protects secrecy of ballot/vote - Records selections and non-selection of individual choices for each contest - Increment the ballot counter **Scenario 1)** - 20 ballots will be test (a 50% sample of 40 ballot styles)	M100 Only- Election Day Voting in Polling Place 1 - Zero count report - Using media that is near capacity scan the hand marked ballots - An error "Audit Log Full" is generated. - Error message must advise the official how to handle the error.

Method Detail	Volume 2 Test Method	Volume 4 Test Method
	- Reuse the ballots for 20 different ballot styles within the deck that were generated on the VAT for the Unity 3.2.0.0 certification effort. - M100- scans the ballots generated by the VAT with different ballot styles within the deck. - Ballot styles 1 through 10, 20 and 40 will be voted - The M100 In Election Day mode with a single precinct and 40 ballot styles will not error. If there are any system errors that cause the M100 to shut down then the M100 shall recover without any loss of data. **Scenario 2)** Errors should prevent the test from reaching this point. If the test does get to this point: M100 - Load election on to the M100 containing 41 ballot styles in a singe precinct. - No system failures that cause the M100 to crash or loss data - If there are any system errors that cause the M100 to crash then the M100 shall recover without any loss of data.	- If there are any system errors that cause the M100 to crash then verify the M100 will recover without any loss of data.
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	Same as Volume 1 - Maximum Precincts and Ballot Styles; except - report of normal/abnormal events is found within the 50% sample.	The system audit provides a time stamped, report of normal/abnormal events found within the tested. Error messages are: - Are generated, stored & reported as they occur - Errors requiring intervention by the poll worker clearly display issues & action instructions in easily understood text language or with indicators - Incorrect responses will not lead to irreversible errors.
Post-vote: Closing the Polls	Once the polls are closed the voting system Same as Volume 1 - Maximum Ballot Styles for paper on the M100; except - - M100 Prints a single precinct totals report totaling all ballot styles within the precinct (Election Day voting ends)	Not Applicable (only testing for error recovery of full media on hardware)
Post-vote: Central Count	Same as Volume 1 - Maximum Precincts and Ballot Styles; except - View and Print Precinct by Precinct Report for Precinct 1 with 40 ballot styles **Scenario 2)** Errors should prevent the test from reaching this point. If the test does get to this point: ERM Same as Volume 1 - Maximum Precincts and Ballot Styles; except - View and Print Precinct by Precinct Report for Precinct 1 with 41 ballot styles - No system failures that cause the ERM application to crash - If there are any system errors that cause the ERM to crash then the ERM application shall recover without any loss of data.	Not Applicable (only testing for error recovery of full media on M100 hardware)
Expected Results are observed	Review the test result against the expected result: Same as Volume 1 - Maximum Ballot Styles for paper on the M100	Review the test result against the expected result: • Same as Volume 1 - Maximum ballot styles for paper
Record observations and all input/outputs for each election;	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. Same as Volume 1 - Maximum Ballot Styles for paper on the M100	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. Same as Volume 1 - Maximum ballot styles for paper on the M100

7.1.4 Volume Test Methods (Volume 5 & 11)

Method Detail	Volume 5 Test Method	Volume 11 Test Method
Test Case Name	Volume 5 - Error Recovery on the M100	Volume 11 - Maximum number precincts in an early voting polling location on the M100
Scope - identifies the type of test	The scope is to reuse SysTest M100 Electrical Supply test (2 hour batter error recovery) and iBeta's M100 Volume and Stress testing: Recovery tests verify the ability of the system to recover from hardware and data errors. Power recovery was tested by SysTest in the M100 Electrical Supply Test Case. ES&S has petitioned the EAC for reuse of the applicable components in scope for Unity 3.2.1.0 from the SysTest testing of the Unity v.4.0.0.0 certification test effort. Determination of reuse was based upon the EAC review of SysTest Electrical Supply test results. iBeta incorporates verification of audit logging of error recovery in the Volume Test Cases	The scope is to test 450 precincts on 1 PCMCIA card, creating and tally the election on a Peer-to-peer configuration (multiple PCs) set up. **Scenario 1)** Test the maximum allowed: number of precincts in a single early voting polling location To verify that errors are generated when: **Scenario 2)** Exceeding the HPM maximum allowed: number of precincts in a single early voting polling location Functional testing of discrepancy #20 in ERM (#104 transferred from Unity 3.2.0.0)
Test Objective	Determination by the EAC of the ES&S Unity 4.0.0.0 reuse and the EAC acceptance of the iBeta Volume methods. All Error Recovery testing has been covered throughout the Volume and Electrical Supply testing.	The objective is to validate the ability to process, store and report data to the maximum and exceeding the maximum allowed number of precincts in a single polling location. The election will be created and tallied on a peer-to-peer configuration (multiple PCs) set up. To validate that the system generates errors during EMS ballot preparation (ballot preparation including: EDM, ESSIM & HPM) when exceeding maximum the allowed number of precincts in a single polling location. Validating the processing, storing and reporting shall occur without system degradation. If there are system errors then the system shall recover without any loss of data.
Test Variables: Volume, Stress, Performance, Error Recovery	Test case must have: Verify EAC acceptance of reuse of the "Electrical Supply" test case. Verify all Volume 1, 2, 4, 11 & 12 test steps pass.	General election by Precinct **Scenario 1)** M100 set up for Early Voting 450 precincts 5 ballot styles 10 contests total (2 contesting per ballot style) 5 candidates per contest (50 total) 5 District Types 5 District Names 10 District Relations 10 Office Relations 11" Ballots (36 oval positions per column, 6 columns, 216 total positions) 2 Statistical Counters (ballots counted and precincts counted) 1 Polling Place set up as an early voting location Contest 1 w/candidates 1 - 5 and 2 w/candidates 6 - 10 in Precincts 1 – 100, ballot style 1 Contest 3 w/candidates 11 - 15 and 4 w/candidates 16 - 20 in Precincts 101,- 200ballot style 2 Contest 5 w/candidates 21 - 25 and 6 w/candidates 26 - 30 in Precincts 201-300, ballot style 3

Method Detail	Volume 5 Test Method	Volume 11 Test Method
		Contest 7 w/candidates 31 - 35 and 8 w/candidates 36 - 40 in Precincts 301-400, ballot style 4 Contest 9 w/candidates 41 - 45 and 10 w/candidates 46 - 50 in Precincts 401-450, ballot style 5 Discrepancy 20: Set Jurisdiction System Type to "Precinct Count" **Scenario 2)** Same as scenario 1 except: - 451 precincts
A description of the voting system type and the operational environment	The Unity 3.2.1.0 EMS includes a peer-to-peer Network and the M100. Testing includes both reuse of ES&S Unity 3.2.0.0 election databases and creation of new election databases to validate the maximum and exceed the maximum limits.	The Unity 3.2.1.0 EMS includes a peer-to-peer Network: An M100 Precinct Count scanner with 450 precincts in a single Polling Place.
VSS 2002 vol. 1	Same as Volume 1 - Maximum ballot styles for paper on the M100	Same as Volume 1 - Maximum ballot styles for paper on the M100
VSS 2002 vol. 2	A4.3.5 Stress (high volume with interrupts and overloading the systems) A4.3.5 Recovery (system recovers from software and hardware errors without loss of data)	A4.3.5 Volume (maximum and exceeding more than the maximum number of precincts in a Polling Place) A4.3.5 Volume/Stress (Processing, storing and reporting data when overloading the number of precincts in a Polling Place) A4.3.5 Performance/Recovery (Ballot format handling capability-graceful shut down and recovery without loss of data) A4.3.5 Performance/Recovery (Processing rates-graceful shut down and recovery without loss of data)
Hardware, Software voting system con-figuration & test location	Same as Volume 1 - Maximum ballot styles for paper on the M100	Same as Volume 1 - Maximum ballot styles for paper on the M100

Pre-requisites and preparation for test case execution	iBeta Volume Test Cases must have been executed and passed Determination by the EAC allowing the reuse of SysTest Electrical Supply testing	Complete the prerequisites:
		Test Method Validation: Technical review conducted by C Coggins & J Garcia; Approved 9/14/09 for validation of test method as defined in ISO/IEC 17025 clause 5.4.5.
		
		Import Wizard method validation completed in Unity 3.2.0.0
		- Excel spreadsheets saved as "Tab Delimited". Tab Delimited documents containing election creating information will be imported into EDM using the Import Wizard option.
		    Spreadsheet 1 - Precincts 450 and 451
		    Spreadsheet 2 - District Types 5
		    Spreadsheet 3 - Districts Names 5
		    Spreadsheet 4 - District Relations 5
		    Spreadsheet 5 - Master Office 10
		    Spreadsheet 6 - Office Relations 10
		    Spreadsheet 7 - Candidates 50

Getting Started Checks	Not Applicable (Testing is being performed in all iBeta Volume test cases and in the EAC acceptance of the "Electrical Supply test case" reuse tested by SysTest.)	Test Data: Same as Volume 1 - Maximum ballot styles for paper
Documentation of Test Data & Test Results	Testing is being recorded in all iBeta Volume test cases and in the determination of EAC acceptance of the "Electrical Supply test case" reuse tested by SysTest.	Test Data: • Same as Volume 1 - Maximum ballot styles for paper

Method Detail	Volume 5 Test Method	Volume 11 Test Method
Volume: Paper-based voting systems Processing	Review SysTest and iBeta Test Cases and validate the following: Vote processing	Ballot Prep: -An election database can be accurately/securely defined & formatted using the Import Wizard. -Ballots (candidates) can be accurately defined & generated. **Scenario 1)** Election can be created and installed with 450 Precincts in a single Early Voting poll location. No error occurs - 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. - Review the EDM, ESSIM and HPM reports to verify election set up. **Scenario 2)** Same as scenario 1 except over the maximum allowed number of Precincts in a single Early Voting poll location (451). Test execution of Scenario 2 is expected to stop at this point with errors generated in the ballot preparation prior to the creation of election media - Check audit logs for critical status messages. Test stops unless system does not error and creates media) - If EDM does not error during the "Ballot Sets Merge" then the EDM reports must be reviewed to verify 451 precincts have been created and assigned to a single early voting Polling Place. Continue to ESSIM and HPM. The system should display a critical status message prior to exiting the HPM. - 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.
Volume:	Review SysTest and iBeta Test Cases and validate the following: Overloading systems capacity to process, store, and report data.	Overloading systems capacity to process, store, and report data. - When importing over the allowed amount of data into the EDM using the Import Wizard - Overloading the HPM with more than the allowed number of precincts in a single polling place.
Stress	Review SysTest and iBeta Test Cases and validate the following: Software response to power interrupts.	System responses to overloading conditions, exceeding the maximum allowed number of Early Voting precincts in a single Polling location.
Error Recovery	Review SysTest and iBeta Test Cases and validate the following: Voting system availability to recover gracefully from errors or crashes caused by power failures.	There is no system degradation (Ballot format handling capability and Processing rates): - When importing large amount of data into the EDM using the Import Wizard. - The system does not slow down throughout the testing
Readiness Testing and Poll Verification	Not Applicable (Testing is being performed in all iBeta Volume test cases and in the EAC acceptance of the "Electrical Supply test case" reuse tested by SysTest.)	Same as Volume 1 - Maximum ballot styles for paper on the M100
Pre- vote: Opening the Polls Verification	Not Applicable (Testing is being performed in all iBeta Volume test cases and in the EAC acceptance of the "Electrical Supply test case" reuse tested by SysTest.)	Voting system is ready for the election: Same as Volume 1 - Maximum Precincts Limitations and ballot styles for paper except: - Run 2 precincts to validate the system is ready; confirm the test

Method Detail	Volume 5 Test Method	Volume 11 Test Method
		data is segregated from voting data, with no residual effect. Verify totals and audit logs.
Voting: Ballot Activation and Casting Verifications	Not Applicable (Testing is being performed in all iBeta Volume test cases and in the EAC acceptance of the "Electrical Supply test case" reuse tested by SysTest.)	Precinct Count/ Paper based: •Same as Volume 1 - Maximum ballot styles for paper on the M100
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	Not Applicable (Testing is being performed in all iBeta Volume test cases and in the EAC acceptance of the "Electrical Supply test case" reuse tested by SysTest.)	**Scenario 1) Early Voting** - M100 is set up for Early Voting and has all Precincts 1-450. - Voting using 90 different precincts (20% of 450 precincts), 18 ballots per ballot style, ballot styles 1-4 have 100 precincts and ballot style 5 has 50 precincts, each style has 2 contests. A total of 90 ballots will be voted. - Hand mark ballots all but 10% of the ballots - Mark 10% of the ballots using the VAT - Scan using the M100 - No errors are expected. - If there are any system errors that cause the M100 & the VAT to crash then verify the M100 and the VAT recover without any loss of data. - Verify the counter (number of voters) on the M100 and the VAT match the expect results. **Scenario 2)** Errors should prevent the test from reaching this point. If the test does get to this point: - Load election - No system failures that cause the M100 and/or the VAT to crash - If there are any system errors that cause the M100 and the VAT to crash then the M100 and the VAT shall recover without any loss of data.
Post-vote: Closing the Polls	Not Applicable (Testing is being performed in all iBeta Volume test cases and in the EAC acceptance of the "Electrical Supply test case" reuse tested by SysTest.)	Same as Volume 1 - Maximum ballot styles for paper on the M100
Post-vote: Central Count	Not Applicable (Testing is being performed in all iBeta Volume test cases and in the EAC acceptance of reuse tested by SysTest "Electrical Supply test case".	Once the polls are closed the voting system - Printed reports of ballots counted by tabulator - The reported votes match the predicted votes for the tabulator with votes and undervotes. - In the Early Voting Poll location prints the M100 summary report with all 450 precincts (early voting ends)
Expected Results are observed	Review the test result against the expected result: Same as Volume 1 - Maximum ballot styles for paper	**Scenario 1)** The (ERM) central count voting system: Discrepancy 20: Setting "Precinct Count" in HPM does not cause an error in ERM "Error: File: "TC name" CTR, Error: #35 - File does not exist." The election cannot proceed". - Discrepancy 20: verify no error " "Convert Precinct Results File: The precincts results file is from older software and is being converted."

Method Detail	Volume 5 Test Method	Volume 11 Test Method

		and "Error: File: Vol8S1.CTR, Error: #35 - File does not exist." is displayed when attempting to re-launch ERM.
		- Correctly displays the Election
		- Print a Zero count report (to verify no votes have been updated into the ERM prior to starting consolidation)
		- No errors are expected.
		- If there are any system errors that cause the ERM to crash then the system shall recover without any loss of data.
		Vote Consolidation:
		- ERM consolidated reports match the predicted votes.
		- Verify no data was lost within the audit logs or results
		Reports include:
		- Printed reports of ballots counted by tabulator, with votes and undervotes
		  - Print the Summary Report
		  - View and Print Precinct by Precinct Reports
		
		Scenario 2) Errors should prevent the test from reaching this point. If the test does get to this point: - continue to the ERM - No system failures that cause the EMS ERM application to crash - If there are any system errors cause the EMS ERM application to crash then the ERM application shall recover without any loss of data.

Record observations and all input/outputs for each election;	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. Same as Volume 1 - Maximum ballot styles for paper	Review the test result against the expected result: • Same as Volume 1 - Maximum ballot styles for paper on the M100

7.1.5 Volume Test Method (Volume 12)

Method Detail	Volume 12 Test Method
Test Case Name	Volume 12 - Maximum number precincts in an polling place polling place.
Scope - identifies the type of test	The scope is to test 18 precincts on 1 PCMCIA card, create and tally the election on a Peer to Peer configuration (multiple PCs) set up. Scenario 1) Test the M100 maximum allowed: number of Election Day precincts in a single polling place in handled on the M100 To verify that errors are generated when: Scenario 2) In HPM when exceeding the M100 maximum allowed: number of Election Day precincts in a single polling Place.
Test Objective	The objective is to validate the ability to process, store and report data to the M100 maximum and exceeding the maximum allowed number of precincts in a single polling place. The election will be created and tallied on a Peer to Peer configuration (multiple PCs) set up. To validate that the system generates errors during EMS ballot preparation (ballot preparation including: EDM, ESSIM & HPM) when exceeding maximum the allowed number of precincts in a single polling place. Validating the processing, storing and reporting shall occur without system degradation. If there are system errors then the system shall recover without any loss of data.
Test Variables: Volume Stress Performance Error Recovery	Closed Primary by style Election Day voting Scenario 1) 2 parties 18 precincts 2 ballot styles (1 for REP and 1 for DEM) each will be included in all 18 precincts. 6 contests total (2 partisan and 4 non partisan) 10 candidates per contest (total of 60) Vote for 1 and 2 candidates (1 Partisan and 1 Non-Partisan = Vote for 1 and 1 Partisan and 3 Non- Partisan = Vote for 2) Write-Ins on each of the contests 5 District Types 5 District Names 5 District Relations 6 Office Relations 17" Ballots (45 oval positions per column, 6 columns, 270 total positions) 2 Statistical Counters 1 Polling Place Scenario 2) Same as scenario 1 except: - 19 precincts
A description of the voting system type and the operational environment	The Unity 3.2.1.0 EMS includes a Peer to Peer Network: An M100 Precinct Count scanner with 18 precincts in a single Polling Place and using a Peer to Peer PC configuration.
VSS 2002 vol. 1	• Same as Volume 1 - Maximum ballot styles for paper on the M100
VSS 2002 vol. 2	A4.3.5 Volume (maximum and exceeding more than the maximum number of precincts in a Polling Place) A4.3.5 Volume/Stress (Processing, storing and reporting data when overloading the number of precincts in a Polling Place) A4.3.5 Performance/Recovery (Ballot format handling capability-graceful shut down and recovery without loss of data)

Method Detail	Volume 12 Test Method
	A4.3.5 Performance/Recovery (Processing rates-graceful shut down and recovery without loss of data)
Hardware, Software voting system configuration and test place	• Same as Volume 1 - Maximum ballot styles for paper
Pre-requisites and preparation for execution of the test case.	Complete the prerequisites: Test Method Validation: Technical review conducted by Carolyn Coggins Approved 9/17/09 for validation of test method as defined in ISO/IEC 17025 clause 5.4.5. Import Wizard method tested and validated in Unity 3.2.0.0 certification test effort - Excel spreadsheets saved as "Tab Delimited". Tab Delimited documents containing election creating information will be imported into EDM using the Import Wizard option. 　　Spreadsheet 1 - Precincts 18 and 19 　　Spreadsheet 2 - District Types 5 　　Spreadsheet 3 - Districts Names 5 　　Spreadsheet 4 - District Relations 5 　　Spreadsheet 5 - Master Office 6 　　Spreadsheet 6 - Office Relations 6 　　Spreadsheet 7 - Candidates 60
Getting Started Checks	• Same as Volume 1 - Maximum ballot styles for paper on the M100
Documentation of Test Data & Test Results	• Same as Volume 1 - Maximum ballot styles for paper on the M100
Volume: Paper-based voting systems Processing	Ballot Prep: -An election database can be accurately/securely defined & formatted using the Import Wizard. -Ballots (candidates) can be accurately defined & generated. **Scenario 1)** Election can be created and installed with 18 Precincts in a single polling place poll place. No error occurs - 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. - Review the EDM, ESSIM and HPM reports to verify election set up. **Scenario 2)** Same as scenario 1 except over the maximum allowed number of Precincts in a single polling place poll place (19). Test execution of Scenario 2 is expected to stop at this point with errors generated in the ballot preparation prior to the creation of election media - Check audit logs for critical status messages. Test stops unless system does not error and creates media) - If EDM does not error during the "Ballot Sets Merge" then the EDM reports must be reviewed to verify 19 precincts have been created and assigned to a single polling place. Continue to ESSIM and HPM. The system should display a critical status message prior to exiting the HPM. - 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.
Volume:	Overloading systems capacity to process, store, and report data. - When importing over the allowed amount of data into the EDM using the Import Wizard - Overloading the HPM with more than the allowed number of precincts in a single polling place.
Stress	System responses to overloading conditions. Exceeding the maximum allowed number of polling place precincts in a single Polling place .
Performance	There is no system degradation (Ballot format handling capability and Processing rates): - When importing large amount of data into the EDM using the Import Wizard. - The system does not slow down throughout the testing

Method Detail	Volume 12 Test Method
Error Recovery	• Same as Volume 1 - Maximum ballot styles for paper on the M100
Readiness Testing and Poll Verification	Voting system is ready for the election: • Same as Volume 1 - Maximum ballot styles for paper on the M100 - 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.
Pre- vote: Opening the Polls Verification	Precinct Count/ Paper based: • Same as Volume 1 - Maximum ballot styles for paper on the M100
Voting: Ballot Activation and Casting Verifications	Scenario 1) A polling place - M100 is set up for polling place and has all Precincts 1-18. - Voting using 36 ballots, 2 ballots per ballot style - Hand mark ballots all but 10% of the ballots - Mark 10% of the ballots using the VAT - Scan using the M100 - No errors are expected. - If there are any system errors that cause the M100 & the VAT to crash then verify the M100 and the VAT recover without any loss of data. - Verify the counter (number of voters) on the M100 and the VAT match the expect results. Scenario 2) Errors should prevent the test from reaching this point. If the test does get to this point: - Load election - No system failures that cause the M100 and/or the VAT to crash - If there are any system errors that cause the M100 and the VAT to crash then the M100 and the VAT shall recover without any loss of data.
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	• Same as Volume 1 - Maximum ballot styles for paper
Post-vote: Closing the Polls	Once the polls are closed the voting system - Printed reports of ballots counted by tabulator - Votes reported match the predicted votes from tabulator with votes and undervotes. - In the polling place Poll place print the M100 summary report with all of the 450 precincts (polling place ends)
Post-vote: Central Count	Scenario 1) The (ERM) central count voting system: - Correctly displays the Election - Print a Zero count report (to verify no votes have been updated into the ERM prior to starting consolidation) - No errors are expected. - If there are any system errors that cause the ERM to crash then the system shall recover without any loss of data. Vote Consolidation: - ERM consolidated reports match the predicted votes - Verify no data was lost within the audit logs or results Reports include: - Printed reports of ballots counted by tabulator, with votes and undervotes - Print the Summary Report

Method Detail	Volume 12 Test Method
	- View and Print Precinct by Precinct Reports Scenario 2) Errors should prevent the test from reaching this point. If the test does get to this point: - continue to the ERM - No system failures that cause the EMS ERM application to crash - If there are any system errors cause the EMS ERM application to crash then the ERM application shall recover without any loss of data.
Expected Results are observed	Review the test result against the expected result: • Same as Volume 1 - Maximum ballot styles for paper on the M100
Record observations and all input/outputs for each election;	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the test case. • Same as Volume 1 - Maximum ballot styles for paper on the M100

7.1.6 Security, Telephony and Cryptographic Test Methods

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
Test Case Name	Security Review and Test Case	Telephony and Cryptographic Test Case
Scope - identifies the type of test	Security testing crosses into several areas of voting system testing and thus must be tested at the integrated system level. System Level Tests are customized for the specific voting system to test the security elements incorporated into the pre-vote, voting and post voting functions. Further examination is performed in Telephony and Cryptographic Tests. A review of the security documentation addresses Access Controls, Physical Security and Software Security.	Telephony and Cryptographic testing covers the use of public and non-physically controlled communications as well as the use of required cryptographic techniques in those subsystems for systems that use the public communications networks.
Test Objective	The objective of security testing is to minimize the risk of accidents, inadvertent mistakes and errors; protect from intentional manipulation, fraud or malicious mischief;	The Unity 3.2.1.0 voting system is exempt from the telecommunications and cryptographic requirements
Test Variables: Voting Variations (as supported by the voting system)	In the general and primary elections validate the security of the pre-vote, voting, and post voting functions of the voting system by test incorporating overflow conditions, boundaries, password configurations, negative testing, inputs to exercise errors and status messages, protection of the secrecy in the voting process and identification of fraudulent or erroneous changes. Including: Unauthorized changes to system capabilities for: - Defining ballot formats, - Casting and recording votes, - Calculating vote totals consistent with defined ballot formats, - Reporting vote totals, - Alteration of voting system audit trails, - Changing or preventing the recording of a vote, - Introducing data not cast by an authorized voter, - Changing calculated vote totals, - Preventing access to vote data, including individual votes and vote totals, to unauthorized individuals, and - Preventing access to voter identification data and data for votes cast by the voter such that an individual can determine the content of specific votes cast by the voter.	In the security review and security test case, the applicability of telephony and cryptography is assessed and tested. Confirm no telephony or non-local communications are utilized in the Unity 3.2.1.0 certification and therefore no telephony and cryptography test is required.
A description of the voting system type and the operational environment	Same equipment and apparatus as the Unity 3.2.0.0 certification except for the addition of: M100: Precinct count based, voter-activated paper ballot counter and vote tabulator. May also be used in a central count location as a ballot counter and vote tabulator. Addition of multiple workstations connected over a LAN in both election preparation and election reporting locations.	The operational environment excludes any telecommunications and excludes any connection to public communications networks.
VSS 2002 vol. 1	2.2.1, 2.2.4 thru 2.2.5.2.3, 6.2 thru 6.4	5.1 thru 5.2.7, 6.5.3, 6.6.1
VSS 2002 vol. 2	6.4 thru 6.4.2	6.4.2
Hardware, Software voting system	This security test is an incremental change to the Unity 3.2.0.0 certified voting system. The configuration includes the same election preparation	Not applicable

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
configuration and test location	and central count applications and devices certified in the Unity 3.2.0.0 configurations. The subsystems included in that certification include EDM (election definition), AIMS (VAT election definition and ballot preparation), ESSIM (ballot preparation), AM (auditing for EDM, ESSIM), HPM and ERM (central count reporting) as well as the voting devices DS200 (precinct scanner), VAT (precinct ballot marking device), and M650 (central count scanner). In addition the M100 acting as either a precinct scanner or central count scanner is added to this certification. This certification also differs from the Unity 3.2.0.0 certification by the addition of a LAN to both the election definition location and central count location. No voting devices are connected to the LAN. All deployments are performed by the physical transport of memory devices consistent with the Unity 3.2.0.0 certification.

Configuration 1 (peer-to-peer) Multiple Windows XP SP3 workstations are connected over a LAN. This configuration may also include a network printer.
Configuration 2 (domain) Multiple Windows XP SP3 workstations are connected on a LAN that includes a Windows 2003 fileserver (or domain server). This configuration may also include a network printer.

Ballot definition (EDM) and ballot preparation (ESSIM) applications may share the network but are procedurally prevented from accessing the same election over the network. Ballot definition deployment (HPM) applications are procedurally prevented from modifying any ballot definitions in a network but are allowed read-only access to ballot definitions to facilitate large deployments. Multiple election reporting workstations may share the election results database to share reporting tasks. | |
| Pre-requisites and preparation for execution of the test case. | The System Level and Telephony and Cryptographic Test Cases are reviewed to ensure that they incorporate the security test requirements and the procedural requirements identified in the vendor supplied security documentation.
 - Additional tests, not covered in the System Level Test Cases are performed as applicable for the security requirements of the system.
 - COTS applications necessary for PC hardening are downloaded or otherwise obtained and validated.
 - Configurations described above are prepared. COTS PC's are hardened as per vendor documentation and appropriate election applications are loaded. | During Pre-test Maintenance of the M100 observe the technician remove the modem |
| Getting Started Checks | Prior to testing Verify the following through Document Review
-M100 documentation contains instructions to physically protect the PC cards during and following an election.
-M100 documentation contains for security provisions that are compatible with the procedure and administrative tasks involved in equipment preparation, testing, and operation. | Not applicable |

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
	-M100 documentation contains mandatory administrative procedures are provided for effective system security. -Documentation specifies usage of tamper-evident seals to protect the modem, PC-card slot(s), serial ports, polls-open/close switch, and printer compartment during polls-open, and to protect the firmware at all times after it is loaded with a trusted build. -M100 documentation includes maintaining the zeroization report as part of the official audit record. -M100 manual identifies access control security measures including software, hardware, communication, password management, operating system provided controls, supervisor privileges, and segregation of duties. -M100 documentation contains procedures for recovering from a failure of a memory component or data processing component. -M100 documentation contains procedures for handling the failure of any data input or storage device. -M100 documentation contains procedures for installation of software including hardware containing firmware. -Documentation contains procedures for the secure handling of ballot boxes and data in central count. -Documentation contains procedures for the physical security and detection of tampering in polling places. -Documentation contains detailed description of physical access control measures to prevent unauthorized access to the voting system. -During trusted build procedures and installation, verify source code, compilers or assemblers are not resident. - Documentation states that jurisdictional procedures control multiple user access to election definition files in EDM, ESSIM, AM and AIMS. - Documentation states that jurisdictional procedures control multiple user access to election definition files in HPM. Multiple user access to HPM files is "read-only" during preparation of election definition cartridges for M100, DS200, M650 and VAT. - By document review verify that the multiple user access capabilities of ERM are documented sufficiently to allow a code reviewer to verify and analyze the multi-user capabilities of ERM users. -By source code review M100 validates checksums when the PC card is input -By source code review M100 memory is zeroed out prior to election -By source code review computer generated keys are random -By source code review multiuser access in ERM prevents data corruption, deadlocks, and race conditions.	
Documentation of Test Data & Test Results	Record the results of the security testing in the Security test case. Summarize and record the results of security testing, document & source code reviews in the applicable Security Review tabs. Enter Accept against each review requirement.	Record observation of the removal of the modem from the M100 in the Telephony and Cryptographic Test Case

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
	Log discrepancies on the appropriate Discrepancy Report	

Pre-vote: Ballot Preparation procedures verifications	Follow steps in the System Level, and Security Test Cases. -Performing windows hardening tests on Windows XP and Windows 2003 in a network enabled configuration including
	        - cannot boot to CD or USB devices
	        - non-administrators cannot install applications
	        - users cannot make undetected modifications to election software or data
	        - non-administrators cannot execute non-election related applications
	        - non-administrators cannot clear windows event logs
	        - windows login authentication is required on the terminal
	        - windows event logs contain user login information and user access to applications and objects
	        - verify that the terminal meets best-practice configuration requirements
	        - no source code or compilers are present
	        - perform network penetration testing on network ports
	        - verify that any built-in wireless or modems are inaccessible during voting
	        - verify that HPM requires a non-default password be set in the M100 memory card in order to re-open the polls
		Not applicable

Pre-vote: Ballot Preparation Security	--A guest user or an anonymous user is not allowed access to voting software or data files. --For all networked systems (ESSIM,EDM,HPM,AIMS,AM and ERM) different non-administrative users who would not normally have access to files cannot access critical system files over the network and make undetected modifications to their content. -- Unplugging network cables during ballot definition does not irreversibly affect these operations or lead to corrupted output files (EDM,ESSIM,HPM,AIMS).	Not applicable
Readiness Testing and Poll Verification	-Verifying malicious firmware update or modified firmware update on PC card cannot be installed on M100. -Verifying modified (malicious and non-malicious modifications) election definition of the file on PC card can not be installed. -Verifying the firmware version on M100. -Attempts to break into the M100 through the serial port fail. -Verifying no source code or compilers or assemblers are resident or accessible -Verifying locks can not be picked easily. --Attempt to insert the ballot prior to opening the polls. No votes can be recorded prior to opening the polls --Attempting to access the operating system on M100 --Audit logs contain entries for failed attempts, normal & abnormal events.	Not applicable
Pre- vote:	-Verify zero totals report, to check vote count is "0" when the scanner is	Not applicable

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
Opening the Polls Verification	turned on.	
Voting: Ballot Activation and Casting Verifications	--Attempt to remove the key ,when the key is in voting mode. --Attempt to Insert blank ballot or invalid ballot(ballot from wrong election). --Attempt to scanning multiple ballots. --Attempt to count the same ballot twice by physical manipulation --Attempt to print audit log as voter. --Attempt to remove the PC card in middle of the operation. --Attempt to unplug the power(without battery) to test recovery is possible. --Verify PC card insertion and removal is logged before closing the polls. --Audit logs contain entries for failed attempts, normal & abnormal events. --Audit log cannot be printed during the voting mode --Remove paper source from the M100 to verify M100 election process halts. --Attempt to consolidate the PC card with open polls in ERM -- Verify that the M100 when the PCMCIA card is write-locked refuses to scan ballots	Not applicable
Voting: Voting System Integrity, System Audit, Errors & Status Indicators	Audit logs contain entries for failed attempts, normal & abnormal events.	Not applicable
Post-vote: Closing the Polls	--Attempt to reopen polls with invalid password --Verify key and 3 digit pin is required to reopen polls --Unable to modify the M100 audit log externally on the PC card validated through the M100 and ERM interfaces --Verify physical removal of internal modem --Unable to modify the M100 audit log through the system. --Unable to modem results through a modem connected to the serial port. --M100 serial port does not respond to 2 character queries --Modem attached to M100 serial port does not answer phone and generate a carrier signal.	Not applicable
Post-vote: Central Count	-- Any direct, voting-application coordinated modification of vote counts requires authentication and username is logged. -- Through the M100 interface, unable to manually modify vote counts. -- If access to incomplete election results in ERM is present, the usage of it is configurable, but only by election administrators. -- Any access to incomplete election results cannot modify any official results	Not applicable
Post-vote: Security	--Removing M100 PC card during consolidation at the ERM does not cause irreversible loss of data --Unplugging network cables during vote counting does not irreversibly affect these operations	Not applicable

Method Detail	Security Test Method	Telephony and Cryptographic Test Method
	--Attempt to consolidate same PC card twice into ERM --Verify that both slightly modified (non-malicious) election results and maliciously modified election results of the file on PC card from the M100 can not be loaded into ERM. -- Verify that fuzzed election results of the file on PC card from the M100 can not be loaded into ERM. --A guest user or a anonymous user is not allowed access to voting software or data files in ERM. --For networked system, different non-administrative users cannot access critical system files over the network and make undetected modifications to their content. --Attempt to log into the reporting ERM system and modify votes. --Audit logs contain entries for failed attempts, normal & abnormal events. ---Verify incomplete election returns is configurable(If available) by an election administrator.	
Post-vote: System Audit	Audit logs contain entries for failed attempts, normal & abnormal events.	Not applicable
Expected Results are observed	See System Level and Telephony and Cryptographic Test Cases. Security Review Criteria: - Accept meets the guideline - Reject does not meet the guideline - NA the guideline does not apply	Telephony and Cryptographic Test Cases. - NA the guideline does not apply
Record observations and all input/outputs for each election;	All inputs, outputs, observations, deviations and any other information impacting the integrity of the test results will be recorded in the System Level and Security Test Case. A statement will be prepared addressing the results from the security perspective. It will provide the results of the testing and review required in vol. 1 section 6 for insertion in the test report	Record observation of the removal of the modem from the M100

7.2 Environmental Test Method

Method Detail	Environmental Test Method
Test Case Name	Environmental Test: list of SysTest's' subcontractor testing is identified in Appendix B
Scope - identifies the type of test	Document for reuse of the SysTest's' subcontractor the EAC accepted test results of the VSS 2002 hardware operating and non-operating environmental tests.
Test Objective	Examination of the SysTest's subcontractor Non-Operating/Operating Environmental testing of the Unity 3.2.1.0 hardware to the EAC VSS 2002 for documentation of a passing test results, for the applicable requirements, identification of any engineering changes resulting from testing, and the configuration.
Test Variables: Voting Variations (as supported by the voting system)	Test reports contain testing for: 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). 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). MIL-STD810-D: 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 100 (M100)
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	See Appendix B
Pre-requisites and preparation for execution of the test case.	Determination of reuse from the EAC - Receipt of the Unity v.4.0.0.0 test reports and engineering assessments from SysTest
Getting Started Checks	Identify the appropriate report for each tested piece of equipment ; Create the *Environmental Hardware Test Report Matrix*
Documentation of Test Data & Test Results	Trace the equipment configuration for the VSS 2002 Non-operating/Operating test requirement to the applicable SysTest's subcontractor report in the *Environmental Hardware Test Report Matrix*
Standard Environmental Tests	Test reports from SysTest include test results for all applicable Non-operating/operating environmental hardware VSS 2002 required tests
Expected Results are observed	Environmental test reports, SysTest Lab hardware assessments and engineering change documents identify: • Non-operating/operating environmental hardware VSS 2002 required tests with a passing result • Configuration of the tested hardware • Engineering changes addressing any hardware mitigations
Record observations and all input/outputs for each election;	All examination results will be documented in the *Environmental Hardware Test ReportsMatrix* (Appendix B)

	- Missing documents or clarification requests will reported to the manufacturer as Document Defects in the *Unity 3.2.1.0 Discrepancy Report* - Delivery and verification of documents and clarifications will be noted in the *Unity 3.2.1.0 Discrepancy Report*

7.3 Characteristics (Recovery, Accessibility, Usability & Maintainability) Test Method

Method Detail	Characteristics Test Method
Test Case Name	Characteristics (Recovery, Accessibility, Usability & Maintainability) of the M100
Scope - identifies the type of test	Accessibility, usability and maintainability are characteristics of the voting system. ES&S has petitioned the EAC for reuse of the SysTest testing of the M100 from the Unity v.4.0.0.0 certification test effort. Determination of reuse is identified in Appendix D
Test Objective	The objective of characteristics testing is to verify the accessibility, usability and maintainability requirements of the standards and HAVA are met.
Test Variables: Voting Variations (as supported by the voting system)	See Appendix C
A description of the voting system type and the operational environment	See Appendix C
VSS 2002 vol. 1	2.2.7.1.a thru f, 2.2.7.2.a, 2.2.7.2.b.1 thru i, 2.4.3.1.a, e, &f, 2.2.5.2.1 f.& g, 3.3.1 thru 3.4.2, 3.4.4.1 thru 3.4.6 c, 3.4.9.a thru e HAVA 301a.3 & 4 RFI: 2008-04, 2008-05
VSS 2002 vol. 2	4.7.2, 6.5, 6.7
Hardware, Software voting system configuration and test location	See Appendix C
Pre-requisites and preparation for execution of the test case.	See Appendix C
Getting Started Checks	See Appendix C
Documentation of Test Data & Test Results	See Appendix C
Polling Place Hardware & Recovery	See Appendix C
Accessibility- Common Standards	See Appendix C
DRE Standards	See Appendix C
DRE Standards - Audio information and stimulus	See Appendix C
DRE Accessibility - Telephone handset	See Appendix C
DRE Accessibility- Wireless	See Appendix C
DRE Accessibility- Electronic image displays	See Appendix C
DRE Accessibility- Touch-screen or contact sensitive controls	See Appendix C
DRE Accessibility- Response time	See Appendix C
DRE Accessibility- Sound cues	See Appendix C
DRE Accessibility- Biometric measures	See Appendix C
Physical Characteristics	See Appendix C
Transport, Storage, Materials, & Durability	See Appendix C
Maintainability	See Appendix C
Availability	See Appendix C
Expected Results are observed	See Appendix C
Record observations, all input/outputs for each election;	See Appendix C

7.4 Accuracy (Accuracy, Reliability, Availability, Volume, and Stress) Test Method

iBeta Definition	Accuracy (Accuracy, Reliability, Availability, Volume, and Stress)
Test Case Name	SysTest Unity v.4.0.0.0 Test Cases applicable to the scope of Unity 3.2.1.0: Accuracy Test Case M100
Scope - identifies the type of test	ES&S has petitioned the EAC for reuse of the applicable components in scope for Unity 3.2.1.0 from the SysTest testing of the Unity v.4.0.0.0 certification test effort. Determination of reuse is identified in Appendix C.
Test Objective	Determination by the EAC of the reuse of SysTest testing, test results and test reporting for the tabulators (M100), for Unity 3.2.1.0 from the SysTest testing of the Unity v.4.0.0.0 certification test effort.
Test Variables: Accuracy Volume Stress	See Appendix C
A description of the voting system type and the operational environment	See Appendix C
VSS 2002 vol. 1	2.1.2, 2.1.5. 4.1.1 .a thru d.i, 4.1.5.2.a thru 4.1.6.1.a, 4.3.3, 4.3.5.a thru d
VSS 2002 vol. 2	1.7.1.1, 1.8.2.2, 4.7.1.1, 4.7.3 thru 4.7.4.d.i, 6.1, 6.2.3
Hardware, Software voting system configuration and test location	See Appendix C
Pre-requisites and preparation for execution of the test case.	See Appendix C
Getting Started Checks	See Appendix C
Documentation of Test Data & Test Results	See Appendix C
Accuracy: Paper-based voting systems Processing	See Appendix C
Accuracy: Error Rate	See Appendix C
Reliability	See Appendix C
Availability	See Appendix C
Expected Results are observed	See Appendix C
Record observations and all input/outputs for each election;	Same as Reuse SysTest System Level Test Method

8   Appendices

8.1 Appendix A- VSS 2002 Certification Test Requirements

Appendix A provides a map of the equipment type and features to the Volume 1 VSS 2002 requirements.   The *ES&S Unity 3.2.1.0 EAC Matrix* is provided as a separate document. This document identifies Volume 1 & 2 VSS 2002 requirements applicable to both the voting system and the VSTL test process.   It is utilized by the VSTL and EAC in the certification test process review.

Maufacturer Voting System & Version	Scope	Prior EAC Certification#
ES&S Unity 3.2.1.0 Voting System	Modification for adding the M100 and EMS LAN (VSS 2002)	ESSUnity3200

Unity 3.2.1.0 Modification= Changes will be tested in the Unity 3.2.1.0 Test Cases for the M100 and EMS LAN
- E-M100= Reuse Environmental & Reliability
- NOC-08-001= ESD test required in NOC 08-001
- F-M100= Reuse SysTest Functional, Characteristics, Maintenance, Accessibility, Availability, Data Accuracy
- R3210= Regression System Level which includes both 3.2.0.0 modified and unmodified hardware and software
- S3210= Security Test Case
- T3210= Telephony & Cryptographic Test Case
- V-M100 #= Volume M100 1, 2, 4, 5, 11, or 12 Test Cases
- NA=The requirement is not applicable to the voting system type or is unmodified from Unity 3.2.0.0

Unity 3.2.0.0 Unmodified= No changes, all testing is completed, the testing for results listed here is documented in the Unity 3.2.0.0 Test Report
- E= Reuse Environmental & Reliability
- F= Reuse SysTest Functional, Characteristics, Maintenance, Accessibility, Availability, Data Accuracy
- R= Regression System Level
- S= Security Test Case
- T= Telephony & Cryptographic Test Case
- V1-10= Volume 1 through 10 Test Cases
- NA= The requirement is not applicable to the voting system type

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
2.2	**Overall System Capabilities**				
2.2.1	**Security** System security is achieved through a combination of technical capabilities and sound administrative practices. Te ensure security all systems shall:				
a.	Provide security access controls that limits limit or detect access to critical system components to guard against loss of system integrity, availability, confidentiality, and accountability.	S3210		S	
b.	Provide system functions that are executable only in the intended manner and order, and only under the intended conditions.	S3210, R3210		S, R	
c.	Use the system's control logic to prevent a system function from executing, if any preconditions to the function have not been met.	S3210, R3210		S, R	
d.	Provide safeguards to protect against tampering during	S3210		S	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	system repair, or interventions in system operations, in response to system failure.				
e.	Provide security provisions that are compatible with the procedures and administrative tasks involved in equipment preparation, testing, and operation.	S3210		S	
f.	If access to a system function is to be restricted or controlled the system shall incorporate the means of implementing this capability.	S3210		S	
g.	Provide documentation of mandatory administrative procedures for effective system security.	S3210		S	
2.2.2	**Accuracy** To ensure vote accuracy, all systems shall:				
2.2.2.1	Common Standards to Ensure Vote Accuracy To ensure vote accuracy, all systems shall:				
a.	Records the election contests, candidates, and issues exactly as defined by election officials.	F-M100, R3210		F, R	
b.	Records the appropriate options for casting and recording votes.	F-M100, R3210		F, R	
c.	Records each vote precisely as indicated by the voter and have the ability to produce an accurate report of all votes cast.	F-M100, R3210	RFI 2007-06	F, R	RFI 2007-06
d.	Control logic and data processing methods incorporation parity and check sums (or equivalent error detection and correction methods) to demonstrate the system has been designed for accuracy.	S3210		S	
e.	The software monitors the overall quality of data read-write and transfer quality status, checks the number and types of errors that occur in any of the relevant operations on data and how they were corrected.	S3210		S	
2.2.2.2	DRE System Standards In additional DRE systems shall:				
	As an additional means of ensuring accuracy in DRE systems, voting devices record and retain redundant copies of the original ballot image. A ballot image electronic record of all votes cast by the voter, including undervotes.	NA	RFI 2007-06 No DRE	NA	RFI 2007-06 No DRE
2.2.3	**Error Recovery** To recover from a non-catastrophic failure of a device, or from any error or malfunction that is within the operator's ability to correct, the system shall provide the following capabilities:				
a.	Restoration of the device to the operating condition existing immediately prior to an error or failure, without loss or corruption of voting data previously stored in the device	F-M100, R3210, S3210, V-M100 1, 2, 4, 11, 12		S, V1-10, R, F	
b.	Resumption of normal operation following the correction of a	S3210, R3210,		S, R, F	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	failure in a memory component, or in a data processing component, including the central processing unit	F-M100			
c.	Recovery from any other external condition that causes equipment to become inoperable, provided that catastrophic electrical or mechanical damage due to external phenomena has not occurred.	S3210, R3210, F-M100		S, R, F	
2.2.4	**Integrity** Integrity measures ensure the physical stability and function of the vote recording and counting processes. To ensure system integrity, all systems shall:				
2.2.4.1	Common Standards To ensure system integrity, all systems shall:				
a.	Protect against a single point of failure that would prevent further voting at the polling place.	F-M100		F	
b.	Protects against the interruption of electronic power.	F-M100, V-M100 5		F, V-5	
c.	Protects against electromagnetic radiation.	E-M100		E	
d.	Protects against the ambient temperature and humidity fluctuations.	E-M100		E	
e.	Protects against failure of any data input or storage device.	S3210, V-M100 4		S, V4	
f.	Protects against any attempt at improper data entry or retrieval	S3210		S	
g.	Records and reports of any normal or abnormal events.	S3210		S	
h.	Maintains a permanent record of original audit data that cannot be bypassed or turned off.	S3210		S	
i.	Detect and record every event, including the occurrence of an error condition that the system cannot overcome, and time-dependent or programmed events that occur without the intervention of the voter or a polling place operator	R3210		R	
j.	Include built-in measurement, self-test, and diagnostic software and hardware for detecting and reporting the system's status and degree of operability	S3210		S	
2.2.4.2	DRE Systems Standards In addition to the common requirements, DRE systems shall:				
a.	Maintain a record of each ballot cast using a process and storage location that differs from the main vote detection, interpretation, processing, and reporting path	NA	No DRE	NA	No DRE
b.	Provide a capability to retrieve ballot images in a form readable by humans	NA	No DRE	NA	No DRE
2.2.5	**System Audit** See the requirement for context of these requirements.				RFI 2008-12
2.2.5.2	Operational Requirements				
	Audit records shall be prepared for all phases of election operations performed using devices controlled by the	S3210, R3210, F-M100		S, R, F	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	jurisdiction or its contractors. These records rely upon automated audit data acquisition and machine-generated reports, with manual input of some information. These records shall address the ballot preparation and election definition phase, system readiness tests, and voting and ballot-counting operations. The software shall activate the logging and reporting of audit data as described below.				
2.2.5.2.1	Time, Sequence, and Preservation of Audit Records The timing and sequence of audit record entries is as important as the data contained in the record. All voting systems shall meet the requirements for time, sequence and preservation of audit records outlined below.				
a.	Except where noted, systems shall provide the capability to create and maintain a real-time audit record. This capability records and provides the operator or precinct official with continuous updates on machine status. This information allows effective operator identification of an error condition requiring intervention, and contributes to the reconstruction of election-related events necessary for recounts or litigation.	S3210, R3210, F-M100		S, R, F	
b.	All systems shall include a real-time clock as part of the system's hardware. The system shall maintain an absolute record of the time and date or a record relative to some event whose time and data are known and recorded.	S3210, R3210, F-M100		S, R, F	
c.	All audit record entries shall include the time-and-date stamp.	S3210, R3210, F-M100		S, R, F	
d.	The audit record shall be active whenever the system is in an operating mode. This record shall be available at all times, though it need not be continually visible.	S3210, R3210, F-M100		S, R, F	
e.	The generation of audit record entries shall not be terminated or altered by program control, or by the intervention of any person. The physical security and integrity of the record shall be maintained at all times.	S3210, R3210, F-M100		S, R, F	
f.	Once the system has been activated for any function, the system shall preserve the contents of the audit record during any interruption of power to the system until processing and data reporting have been completed.	S3210, R3210, F-M100		S, R, F	
g. 1) 2) 3)	The system shall be capable of printing a copy of the audit record. A separate printer is not required for the audit record, and the record may be produced on the standard system printer if all the following conditions are met: • The generation of audit trail records does not interfere with the production of output reports • The entries can be identified so as to facilitate their recognition,	S3210, R3210, F-M100		S, R, F	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	segregation, and retention • The audit record entries are kept physically secure				
2.2.5.2.2	Error messages All voting systems shall meet the requirements for error messages below.				
a.	The voting system shall generate, store, and report to the user all error messages as they occur.	S3210, R3210, F-M100		S, R, F	
b.	All error messages requiring intervention by an operator or precinct official shall be displayed or printed clearly in easily understood language text, or by means of other suitable visual indicators.	S3210, R3210, F-M100		S, R, F	
c.	When the voting system uses numerical error codes for trained technician maintenance or repair, the text corresponding to the code shall be self-contained or affixed inside the voting machine. This is intended to reduce inappropriate reactions to error conditions, and to allow for ready and effective problem correction.	S3210, R3210, F-M100		S, R, F	
d.	All error messages for which correction impacts vote recording or vote processing shall be written in a manner that is understandable to an election official who possesses training on system use and operation, but does not possess technical training on system servicing and repair.	S3210, R3210, F-M100		S, R, F	
e.	The message cue for all voting systems shall clearly state the action to be performed in the event that voter or operator response is required.	S3210, R3210, F-M100		S, R, F	
f.	Voting system design shall ensure that erroneous responses will not lead to irreversible error.	S3210, R3210, F-M100		S, R, F	
g.	Nested error conditions are corrected in a controlled sequence such that voting system status shall be restored to the initial state existing before the first error occurred.	S3210, R3210, F-M100		S, R, F	
2.2.5.2.3	Status Messages The Standards/Guidelines provide latitude in software design so that vendors can consider various user processing and reporting needs. The jurisdiction may require some status and information messages to be displayed and reported in real-time. Messages that do not require operator intervention may be stored in memory to be recovered after ballot processing has been completed.				
	The voting system shall display and report critical status messages using clear indicators or English language text. The voting system need not display non-critical status messages at the time of occurrence. Voting systems may display non-critical status messages (i.e., those that do not require operator intervention) by means of numerical codes for subsequent interpretation and reporting as unambiguous text.	S3210, R3210, F-M100		S, R, F	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	Voting systems shall provide a capability for the status messages to become part of the real-time audit record.	S3210, R3210, F-M100		S, R, F	
	The voting system shall provide a capability for a jurisdiction to designate critical status messages.	S3210, R3210, F-M100		S, R, F	
2.2.5.3	COTS General Purpose Computer System Requirements See the standards for the context these requirements. Three operating system protections are required on all such systems on which election software is hosted.		RFI 2008-03 RFI 2008-12		RFI 2008-03 RFI 2008-12
	Authentication shall be configured on the local terminal (display screen and keyboard) and on all external connection devices ("network cards" and "ports"). This ensures that only authorized and identified users affect the system while election software is running.			S	
	Operating system audit shall be enabled for all session openings and closings, for all connection openings and closings, for all process executions and terminations, and for the alteration or deletion of any memory or file object. This ensures the accuracy and completeness of election data stored on the system. It also ensures the existence of an audit record of any person or process altering or deleting system data or election data.	S3210		S	
	The system shall be configured to execute only intended and necessary processes during the execution of election software. The system shall also be configured to halt election software processes upon the termination of any critical system process (such as system audit) during the execution of election software.	S3210		S	
2.2.6	**Election Management System**				
	The Election Management System (EMS) is used to prepare ballots and programs for use in casting and counting votes, and to consolidate, report, and display election results. An EMS shall generate and maintain a database, or one or more interactive databases, that enables election officials or their designees to perform the following functions:	F-M100, R3210		F, R	
a.	Define of the political subdivision boundaries and multiple election districts, as indicated in the system documentation.	F-M100, R3210		F, R	
b.	Identify of contests, candidates, and issues.	F-M100, R3210		F, R	
c.	Define of ballot formats and appropriate voting options.	F-M100, R3210		F, R	
d.	Generate ballots and election-specific programs for vote recording and vote counting equipment.	F-M100, R3210		F, R	
e.	Install ballots and election-specific programs.	F-M100, R3210		F, R	
f.	Test that ballots and programs have been properly prepared and installed.	F-M100, R3210		F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
g.	Accumulate vote totals at multiple reporting levels as indicated in the system documentation.	F-M100, R3210		F, R	
h.	Generate of post-voting reports per Section 2.5.	F-M100, R3210		F, R	
i.	Process and produce audit reports of the data indicated in Section 4.5.	F-M100, R3210		F, R	
2.2.7	**Accessibility**				
2.2.7.1	Common Standards See the standard for diagrams. The voting system meets the following conditions:				
a.	Where clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 48inches. The minimum low forward reach is 15 inches.	F-M100	As applicable to precinct scanners	F	
b.	Where forward reach is over an obstruction with knee space below, the maximum level forward reach is 25 inches. When the obstruction is less than 20 inches deep, the maximum high forward reach is 48 inches. When the obstruction projects 20 to 25 inches, the maximum high forward reach is 44 inches.	F-M100	As applicable to precinct scanners	F	
c.	The position of any operable control is determined with respect to a vertical plane that is 48 inches in length, centered on the operable control, and at the maximum protrusion of the product within the 48-inch length.	F-M100	As applicable to precinct scanners	F	
d.	Where any operable control is 10 inches or less behind the reference plane, have a height that is between 15 inches and 54 inches above the floor.	F-M100	As applicable to precinct scanners	F	
e.	Where any operable control is more than 10 inches and not more than 24 inches behind the reference plane, have a height between 15 inches and 46 inches above the floor.	F-M100	As applicable to precinct scanners	F	
f.	Have operable controls that are not more than 24 inches behind the reference plane.	F-M100	As applicable to precinct scanners	F	
2.2.7.2	**DRE Standards for Accessibility** DRE voting systems shall provide, as part of their configuration, the capability to provide access to voters with a broad range of disabilities. This capability shall:				
a.	Not require the voter to bring their own assistive technology to a polling place.	NA	M100 is not a DRE	F	VAT - Ballot marking only
b	Provide Audio information and stimulus that:				
b.1.	Communicates to the voter the complete content of the ballot.	NA	M100 is not a DRE	F	VAT - Ballot marking only
b.2.	Provides instruction to the voter in operation of the voting device.	NA	M100 is not a DRE	F	VAT - Ballot marking only
b.3.	Provides instruction so that the voter has the same vote capabilities and options as those provided by the system to individuals who are not using audio technology	NA	M100 is not a DRE	F	VAT - Ballot marking only

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
b.4.	For a system that supports write-in voting, enables the voter to review the voter's write-in input, edit that input, and confirm that the edits meet the voter's intent.	NA	M100 is not a DRE	F	VAT - Ballot marking only
b.5.	Enables the voter to request repetition of any system provided information.	NA	M100 is not a DRE	F	VAT - Ballot marking only
b.6.	Supports the use of headphones provided by the system that may be discarded after each use	NA	M100 is not a DRE	F	VAT - Ballot marking only
b.7.	Provides the audio signal through an industry standard connector for private listening using a 1/8 inch stereo headphone jack to allow individual voters to supply personal headsets	NA	M100 is not a DRE	F	VAT - Ballot marking only
b.8.	Provides a volume control with an adjustable amplification up to a maximum of 105 dB that automatically resets to the default for each voter	NA	M100 is not a DRE	F	VAT - Ballot marking only
c.	Provide, in conformance with FCC Part 68, a wireless coupling for assistive devices used by people who are hard of hearing when a system utilizes a telephone style handset to provide audio information	NA	M100 is not a DRE	F	VAT - Ballot marking only
d.	Meet the requirements of ANSI C63.19-2001 Category 4 to avoid electromagnetic interference with assistive hearing devices	NA	M100 is not a DRE	F	VAT - Ballot marking only
e.	For Electronic Image Displays, permit the voter to:				
e.1.	Adjust contrast settings	NA	M100 is not a DRE	F	VAT - Ballot marking only
e.2.	Adjust color settings, when color is used	NA	M100 is not a DRE	F	VAT - Ballot marking only
e.3.	Adjust the size of the text so that the height of capital letters varies over a range of 3 to 6.3 millimeters	NA	M100 is not a DRE	F	VAT - Ballot marking only
f.	For a devise with touch screen or contact-sensitive controls, provide an input method using mechanically operated controls or keys that shall:				
f.1.	Be tactilely discernible without activating the controls or keys.	NA	M100 is not a DRE	F	VAT - Ballot marking only
f.2.	Be operable with one hand and not require tight grasping, pinching, or twisting of the wrist.	NA	M100 is not a DRE	F	VAT - Ballot marking only
f.3.	Require a force less than 5 lbs (22.2 N) to operate.	NA	M100 is not a DRE	F	VAT - Ballot marking only
f.4.	Provide no key repeat function.	NA	M100 is not a DRE	F	VAT - Ballot marking only
g.	For a system that requires a response by a voter in a specific period of time, alert the voter before this time period has expired and allow the voter additional time to indicate that more time is needed	NA	M100 is not a DRE	F	VAT - Ballot marking only
h.	For a system that provides sound cues as a method to alert the voter about a certain condition, such as the occurrence of	NA	M100 is not a DRE	F	VAT - Ballot marking only

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	an error, or a confirmation, the tone shall be accompanied by a visual cue for users who cannot hear the audio prompt				
i.	Provide a secondary means of voter identification or authentication when the primary means of doing so uses biometric measures that require a voter to possess particular biological characteristics	NA	M100 is not a DRE	F	VAT has no biometric measures
2.2.8	**Vote Tabulating Program**				
2.2.8.1	Functions The vote tabulating program software resident in each voting machine, vote count server, or other devices shall include all software modules required to:				
a.	Monitor of system status and generating machine-level audit reports	F-M100, R3210		F, R	
b.	Accommodate device control functions performed by polling place officials and maintenance personnel	F-M100, R3210		F, R	
c.	Register and accumulating votes	F-M100, R3210		F, R	
d.	Accommodate variations in ballot counting logic	F-M100, R3210		F, R	
2.2.8.2	Voting Variation The Technical Data Package accompanying the system shall specifically identify which of the following items can and cannot be supported by the voting system, as well as how the voting system can implement the items support.				
a.	Documented support or non-support of closed primaries.	F-M100, V-M100 1		F	
b.	Documented support or non-support of open primaries.	F-M100, R3210		F	
c.	Documented support or non-support of partisan offices.	F-M100, R3210		F	
d.	Documented support or non-support of non-partisan offices.	F-M100, R3210		F	
e.	Documented support or non-support of write-in voting.	F-M100, R3210		F	
f.	Documented support or non-support of Primary presidential delegation nomination.	F-M100		F	
g.	Documented support or non-support of ballot rotation.	F-M100		F	
h.	Documented support or non-support of straight party voting.	F-M100		F	
i.	Documented support or non-support of cross-party endorsement	F-M100		F	
j.	Documented support or non-support of split precincts.	F-M100, R3210		F	
k.	Documented support or non-support of vote for N of M.	F-M100, R3210		F	
l.	Documented support or non-support of recall issues, with	F-M100		F	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	options.				
m.	Documented support or non-support of cumulative voting.	Doc Review	Not supported	F	
n.	Documented support or non-support of ranked over voting.	Doc Review	Not supported	F	
o.	Documented support or non-support of provisional or challenged ballots.	Doc Review	Election procedure	F	
2.2.9	**Ballot Counter** For all voting systems, each device that tabulates ballots shall provide a counter that:.				
a.	Can be set to zero before any ballots are submitted for tally	F-M100, R3210		F, R	
b.	Records the number of ballots cast during a particular test cycle or election	F-M100, R3210		F, R	
c.	Increases the count only by the input of a ballot	F-M100, R3210		F, R	
d.	Prevents or disables the resetting of the counter by any person other than authorized persons at authorized points	F-M100		F	
e.	Is visible to designated election officials	F-M100, R3210		F, R	
2.2.10	**Telecommunications** For all voting systems that use telecommunications for the transmission of data during pre-voting, voting or post-voting activities, capabilities shall be provided that ensure data are transmitted with no alteration or unauthorized disclosure during transmission. Such transmissions shall not violate the privacy, secrecy, and integrity demands of the Standards. Section 5 of the Standards describes telecommunications standards that apply to, at a minimum, the following types of data transmissions:				
	Voter Authentication: Coded information that confirms the identity of a voter for security purposes for a system that transmit votes individually over a public network	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
	Ballot Definition: Information that describes to voting equipment the content and appearance of the ballots to be used in an election	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
	Vote Transmission to Central Site: For voting systems that transmit votes individually over a public network, the transmission of a single vote to the county (or contractor) for consolidation with other county vote data	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
	Vote Count: Information representing the tabulation of votes at any one of several levels: polling place, precinct, or central count	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
	List of Voters: A listing of the individual voters who have cast ballots in a specific election	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
2.2.11	**Data Retention**				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	See standard/guideline for context.				
	All voting systems shall provide for maintaining the integrity of voting and audit data during an election and for a period of at least 22 months thereafter.	Doc Review		TDP	Attestation from ESS
2.3	Pre-voting Functions				
2.3.1	Ballot Preparation				
2.3.1.1	General Capabilities				
	All systems shall provide the general capability for ballot preparation, ballot formatting and ballot production. All systems shall be capable of:	F-M100, R3210		F, R	
2.3.1.1.1	Common Standards All systems shall be capable of:				
a.	Enable the automatic formatting of ballots in accordance with the requirements for offices, candidates, and measures qualified to be placed on the ballot for each political subdivision and election district.	F-M100, R3210		F, R	
b. 1) 2) 3)	Collecting and maintaining the following data: Offices with labels/instructions Candidate names with labels Issues or measures with their text	F-M100, R3210		F, R	
c.	Supporting the maximum number of potentially active voting positions as indicated in the system documentation.	NA	Unmodified from Unity 3.2.0.0	F, V8	
d.	For a primary election, generating ballots that segregate the choices in partisan races by party affiliation	F-M100, R3210		F, R	
e.	Generating ballots that contain identifying codes or marks uniquely associated with each format.	F-M100, R3210		F, R	
f.	Ensuring voter response fields, selection buttons, or switches properly align with the specific candidate names and/or issues printed on the ballot display, ballot card or sheet, or separate ballot pages.	F-M100, R3210		F, R	
2.3.1.1.2	Paper-Based System Standards Paper-based voting systems shall also meet the following requirements applicable to the technology used.				
a.	Enable voters to make selections by punching a hole or by making a mark in areas designated for this purpose upon each ballot card or sheet.	F-M100, R3210		F, R	
b.	For punchcard systems ensure that the vote response fields can be properly aligned with punching devices used to record votes.	NA	M100 is not a punchcard system	NA	Not a punchcard system
c.	For marksense systems, the timing marks align properly with the vote response fields.	F-M100, R3210		F, R	
2.3.1.2	Ballot Formatting All voting systems shall provide a capability for:				
a.	Creation of newly defined elections	F-M100, R3210		F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
b.	Rapid and error-free definition of elections and their associated ballot layouts	F-M100,R3210		F,R	
c.	Uniform allocation of space and fonts used for each office, candidate, and contest such that the voter perceives no active voting position to be preferred to any other.	F-M100, R3210		F, R	
d.	Simultaneous display of the maximum number of choices for a single contest as indicated by the vendor in the system documentation	F-M100		F	
e.	Retention of previously defined formats for an election	F-M100, R3210		F, R	
f.	Prevention of unauthorized modification of any ballot formats	F-M100, R3210		F, R	
g.	Modification by authorized persons of a previously defined ballot format for use in a subsequent election	F-M100, V-M100 4		F, V3 & 4	
2.3.1.3	Ballot Production Ballot production is the process of converting ballot formats to a media ready for use in the physical ballot production or electronic presentation.				
2.3.1.3.1	Common Standards The voting system shall provide a means of printing or other wise generating a ballot display that can be installed in all system voting devices for which it is intended: All systems shall provide a capability to ensure.				
a.	The electronic display or printed document on which the user views the ballot is capable of rendering an image of the ballot in any of the languages required by The Voting Rights Act of 1965, as amended	F-M100	RFI 2008-04	F	RFI 2008-04
b.	The electronic display or printed document where the user views the ballot does not show any advertising or commercial logos of any kind, whether public service, commercial, or political, unless specifically provided for in State law. Electronic displays do not provide connection through hyperlink.	F-M100		F	
c.	The ballot conforms to vendor specifications for type of paper stock, weight, size, shape, size and location of punch or mark field used to record votes, folding, bleed through, and ink for printing if paper ballot documents or paper displays are part of the system	F-M100, R3210		F, R	
2.3.1.3.2	Paper-based System Standards				
	Vendor documentation for marksense systems shall include specifications for ballot materials to ensure that vote selections are read from only a single ballot at a time, without detection of marks from multiple ballots concurrently (e.g., reading of bleed-through from other ballots)	F-M100		F	
2.3.2	Election Programming Process by which election officials or their designees use				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	election databases and vendor system software to logically define the voter choices associated with the contents of the ballots. All systems shall provide for:				
a.	Logical definition of the ballot, including the definition of the number of allowable choices for each office and contest	F-M100, R3210		F, R	
b.	Logical definition of political and administrative subdivisions, where the list of candidates or contests varies between polling places	F-M100, R3210		F, R	
c.	Exclusion of any contest on the ballot in which the voter is prohibited from casting a ballot because of place of residence, or other such administrative or geographical criteria	F-M100, R3210		F, R	
d.	Ability to select from a range of voting options to conform to the laws of the jurisdiction in which the system will be used	F-M100, R3210		F, R	
e.	Generation of all required master and distributed copies of the voting program, in conformance with the definition of the ballots for each voting device and polling place, and for each tabulating device	F-M100, R3210		F, R	
2.3.3	**Ballot and Program Installation and Control** All systems shall include the following at the time of ballot an program installation:				
	All systems provide a means of installing ballots and programs on each piece of polling place or central count equipment according to the ballot requirements of the election and the jurisdiction.	F-M100, R3210		F, R	
a.	A detailed work plan or other documentation providing a schedule and steps for the software and ballot installation, including a table outlining the key dates, events and deliverables.	F-M100		F	
b.	A capability for automatically verifying that the software has been properly selected and installed in the equipment or in programmable memory devices and for indicating errors.	F-M100,S3210		F,S	
c.	A capability for automatically validating that software correctly matches the ballot formats that it is intended to process, for detecting errors, and for immediately notifying an election official of detected errors.	F-M100, S3210		F, S	
2.3.4	**Readiness Testing** Election personnel conduct voting equipment and voting system readiness tests prior to the start of an election to ensure that the voting system functions properly, to confirm that voting equipment has been properly integrated, and to obtain equipment status reports. All voting systems shall provide the capabilities to				
2.3.4.1	Common Standards All voting systems shall provide the capabilities to:				
a.	Verify the voting machines or vote recording and data	F-M100,		F, S	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	processing equipment, precinct count equipment, and central count equipment are properly prepared for an election, and collect data that verifies equipment readiness	S3210			
b.	Obtains status and data reports from each set of equipment	F-M100, R3210		F, R	
c.	Verify the correct installation and interface of all system equipment	F-M100, R3210		F, R	
d.	Verify that hardware and software function correctly	F-M100, R3210		F, R	
e.	Generate consolidated data reports at the polling place and higher jurisdictional levels	F-M100, R3210		F, R	
f.	Segregate test data from actual voting data, either procedurally or by hardware/software features	F-M100, R3210		F, R	
	Resident test software, external devices, and special purpose test software connected to or installed in voting devices to simulate operator and voter functions used for these tests meeting the following standards:				
a.	These elements are capable of being tested separately, and are proven to be reliable verification tools prior to their use	F-M100		F	
b.	These elements are incapable of altering or introducing any residual effect on the intended operation of the voting device during any succeeding test and operational phase.	F-M100		F	
2.3.4.2	Paper-Based Systems Paper-based systems shall:				
a.	Supports conversion testing that uses all potential ballot positions as active positions	F-M100		F	
b.	Supports conversion testing of ballots with active position density for systems without pre-designated ballot positions	F-M100		F	
2.3.5	**Verification at the Polling Place** All systems shall provide a formal record of the following, in any media, upon verification of the authenticity of the command source:				RFI 2008-07
a.	The election's identification data;	F-M100, R3210		F, R	
b.	The identification of all equipment units;	F-M100, R3210		F, R	
c.	The identification of the polling place;	F-M100, R3210		F, R	
d.	The identification of all ballot formats;	F-M100, R3210		F, R	
e.	The contents of each active candidate register by office and of each active measure register at all storage locations (showing that they contain only zeros);	F-M100, R3210, S3210		F, R, S	
f.	A list of all ballot fields that can be used to invoke special voting options	F-M100		F	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
g.	Other information needed to confirm the readiness of the equipment, and to accommodate administrative reporting requirements	F-M100, R3210		F, R	
	To prepare voting devices to accept voted ballots, all voting systems shall provide the capability to test each device prior to opening to verify that each is operating correctly. At a minimum the tests shall include.	F-M100, R3210		F, R	
a.	Confirmation that there are no hardware or software failures.	F-M100, R3210		F, R	
b.	Confirmation that the device is ready to be activated for accepting votes.	F-M100, R3210		F, R	
	If a precinct count system includes equipment for the consolidation of polling place data at one or more central counting locations, it shall have means to verify the correct extraction of voting data from transportable memory devices, or to verify the transmission of secure data over secure communication links.	F-M100, R3210	Disabled M100 telecommunication in Unity 3.2.1.0	F, R	Telecommunications is disabled in Unity 3.2.0.0
2.3.6	**Verification at Central Location** Election officials perform verification at the central location to ensure that vote counting and vote consolidation equipment and software function properly before and after an election. Upon verification of the authenticity of the command source, any system used in a central count environment shall provide a printed record of the following:		RFI 2008-07		RFI 2008-07
a.	The election's identification data	F-M100, R3210	Unmodified from Unity 3.2.0.0	F, R	
b.	The contents of each active candidate register by office and of each active measure register at all storage locations (showing that they contain only zeros);	F-M100, R3210	Unmodified from Unity 3.2.0.0	F, R S	S - per v.2: 3.3.1
c.	Other information needed to confirm the readiness of the equipment, and to accommodate administrative reporting requirements.	F-M100, R3210	Unmodified from Unity 3.2.0.0	F, R	
2.4	**Voting Functions** **All voting systems shall support**				
	Opening the polls	F-M100, R3210		F, R	
	Casting the ballot	F-M100, R3210		F, R	
	In addition, all DRE systems shall support: Activating the ballot	NA	M100 is not a DRE	F, R	
	Augmenting the election counter	NA	M100 is not a DRE	F, R	VAT
	Augmenting the life-cycle counter	NA	M100 is not a DRE	NA	No DRE
2.4.1.	**Opening the Polls** At a minimum, the systems shall provide the functional capabilities indicated below.				RFI 2008-07

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
2.4.1.1	Opening the polling Place (Precinct Count Systems) To allow voting devices to be activated for voting, the system shall provide:				
a.	An internal test or diagnostic capability to verify that all of the polling place tests specified in 2.3.5 have been successfully completed.	F-M100, R3210,S3210	S - per v.2: 3.3.1	F, R,S	S - per v.2: 3.3.1
b.	Automatic disabling any device that has not been tested until it has been tested.	F-M100, R3210,S3210	S - per v.2: 3.3.1	F, R,S	S - per v.2: 3.3.1
2.4.1.2	Paper-Based System Standards				
2.4.1.2.1	All Paper-Based systems To facilitate opening the polls, all paper-based systems shall include:				
a.	A means of verifying ballot punching or marking devices are prepared and ready to used;	F-M100, R3210	No ballot punching	F, R	No ballot punching
b.	A voting booth or similar facility, in which the voter may punch or mark the ballot in privacy	F-M100	No ballot punching	F	No ballot punching
c.	Secure receptacles for holding voted ballots. Ballot boxes.	F-M100, R3210, S3210	M100	F, R, S	DS200
2.4.1.2.2	Precinct Count Paper-Based Systems In addition to the above requirements, all paper-based precinct count equipment shall include a means of:				
a.	Activating the ballot counting device.			F, R	
b.	Verifying that the device has been correctly activated and is functioning properly			F, R	
c.	Identifying device failure and corrective action needed.			F, R	
2.4.1.3	DRE System Standards To facilitate opening the polls, all DRE systems shall include:				
a.	A security seal, a password, or a data code recognition capability to prevent the inadvertent or unauthorized actuation of the poll-opening function	NA	M100 is not a DRE	F, R, S	VAT doesn't open polls; it just switches to election marking mode
b.	A means of enforcing the execution of steps in the proper sequence if more than one step is required	NA	M100 is not a DRE	F	
c.	A means of verifying the system has been activated correctly	NA	M100 is not a DRE	F, R	
d.	A means of identifying system failure and any corrective action needed	NA	M100 is not a DRE	F	
2.4.2	Activating the Ballot (DRE Systems) To activate the ballot, all DRE systems shall:				
a.	Enable election officials to control the content of the ballot presented to the voter, whether presented in printed form or electronic display, such that each voter is permitted to record votes only in contests in which that voter is authorized to vote	NA	M100 is not a DRE	F, R	VAT ballot marking functionality
b.	Allow each eligible voter to cast a ballot	NA	M100 is not a DRE	F, R	
c.	Prevent a voter from voting on a ballot to which he or she is not entitled	NA	M100 is not a DRE	F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
d.	Prevent a voter from casting more than one ballot in the same election	NA	M100 is not a DRE	F, R	Blank paper ballot required
e.	Activate the casting of a ballot in a general election	NA	M100 is not a DRE	F	
f.	Enable the selection of the ballot that is appropriate to the party affiliation declared by the voter in a primary election	NA	M100 is not a DRE	F, R	Appropriate blank paper ballot required
g.	Activate all parts of the ballot upon which the voter is entitled to vote	NA	M100 is not a DRE	F,R	Some controls in addition to the paper ballot
h.	Disable of all parts of the ballot upon which the voter is not entitled to vote	NA	M100 is not a DRE	F,R	Some controls in addition to the paper ballot
2.4.3	**Casting a Ballot**				
2.4.3.1	Common Standards To facilitate casting a ballot, all systems shall:				
a.	Provide test that is at least 3 millimeters high and provide the capability to adjust or magnify the text to an apparent size of 6.3 millimeters	F-M100		F	
b.	Protect the secrecy of the vote such that the system cannot reveal any information about how a particular voter voted, except as otherwise required by individual State law	F-M100, R3210		F, R	
c.	Record the selection and non-selection (undervote) of individual vote choices for each contest and ballot measure	F-M100, R3210		F, R	
d.	Record the voter's selection of candidates whose names do not appear on the ballot, if permitted under State law, and record as many write-in votes as the number of candidates the voter is allowed to select	F-M100, R3210		F, R	
e.	In the event of a failure of the main power supply external to the voting system, provide the capability for any voter who is voting at the time to complete casting a ballot, allow for the successful shutdown of the voting system without loss or degradation of the voting and audit data, and allow voters to resume voting once the voting system has reverted to back-up power	F-M100, V-M100 5		F, V5	
f.	Provide the capability for voters to continue cast ballots in the event of a failure of a telecommunications connection within the polling place or between the polling place and any other location	S3210, T3210	No telecommuni-cations in vote casting on the in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
2.4.3.2	paper-based System Standards				
2.4.3.2.1	All Paper-Based Systems All paper-based systems shall:				
a.	Allow the voter to easily identify the voting field that is associated with each candidate or ballot measure response	F-M100, R3210		F, R	
b.	Allow the voter to mark the ballot to register a vote	F-M100, R3210		F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
c.	Allow either the voter or the appropriate election official is able to place the voted ballot into the ballot counting device (precinct count systems) or a secure receptacle (central count systems)	F-M100, R3210		F, R	
d.	Protect the secrecy of the vote throughout the process	F-M100, R3210		F, R	
2.4.3.2.2	Precinct Count Paper-Based Systems In addition to the above requirements, all paper-based precinct count equipment shall include a means of:				
a.	Provide feedback to the voter identifies specific contests or ballot issues for which an overvote or undervote is detected	F-M100, R3210		F, R	
b.	Allow the voter, at the voter's choice, to vote a new ballot or submit the ballot 'as is' without correction	F-M100, R3210		F, R	
c.	Allow an authorized election official to turn off the capabilities defined in the two prior provisions.	F-M100		F	
2.4.3.3	DRE Systems Standards				
a.	Prohibit the voter from accessing or viewing any information on the display screen that has not been authorized by election officials and preprogrammed into the voting system (i.e., no potential for display of external information or linking to other information sources)	NA	M100 is not a DRE	F,S	VAT ballot marking
b.	Enable the voter to easily identify the selection button or switch, or the active area of the ballot display that is associated with each candidate or ballot measure response	NA	M100 is not a DRE	F, R	VAT ballot marking
c.	Allow the voter to select his or her preferences on the ballot in any legal number and combination	NA	M100 is not a DRE	F, R	VAT ballot marking
d.	Indicate that a selection has been made or canceled	NA	M100 is not a DRE	F, R	VAT ballot marking
e.	Indicate to the voter when no selection, or an insufficient number of selections, has been made in a contest (e.g. undervotes)	NA	M100 is not a DRE	F, R	VAT ballot marking
f.	Prevent the voter from overvoting	NA	M100 is not a DRE	F, R	VAT ballot marking
g.	Notify the voter when the selection of candidates and measures is completed	NA	M100 is not a DRE	F, R	VAT ballot marking
h.	Allowing the voter, before the ballot is cast, to review his or her choices and, if the voter desires, to delete or change his or her choices before the ballot is cast	NA	M100 is not a DRE	F, R	VAT ballot marking
i.	For electronic image displays, prompt the voter to confirm the voter's choices before casting his or her ballot, signifying to the voter that casting the ballot is irrevocable and directing the voter to confirm the voter's intention to cast the ballot	NA	M100 is not a DRE	F, R	VAT ballot marking: printing is irrevocable but not casting of the ballot
j.	Notify the voter after the vote has been stored successfully that the ballot has been cast	NA	M100 is not a DRE		No DRE
k	Notify the voter that the ballot has not been cast successfully if it is not stored successfully, including storage of the ballot image, and provide clear instruction as to the steps the voter	NA	M100 is not a DRE		No DRE

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	should take to cast his or her ballot should this event occur				
l.	Provides sufficient computational performance to provide responses back to each voter entry in no more than three seconds	NA	M100 is not a DRE	F	VAT ballot marking; printing exceeds 3 seconds
m.	The votes stored accurately represent the actual votes cast	NA	M100 is not a DRE	F, R	Storage is ballot printing
n.	Preventing modification of the voter's vote after the ballot is cast	NA	M100 is not a DRE	S	Paper ballot handling documentation
o.	Provides a capability to retrieve ballot images in a form readable by humans (in accordance with the requirements of Section 2.2.2.2 and 2.2.4.2)	NA	M100 is not a DRE		No DRE
p.	Incrementing the proper ballot position registers or counters	NA	M100 is not a DRE	F, R	Counts successful prints, not votes cast
q.	Protecting the secrecy of the vote throughout the voting process	NA	M100 is not a DRE	F, R	
r.	Prohibiting access to voted ballots until after the close of polls	NA	M100 is not a DRE		No DRE
s.	Provides the ability for election officials to submit test ballots for use in verifying the end-to-end integrity of the system	NA	M100 is not a DRE	F, R	
t.	Isolating test ballots such that they are accounted for accurately in vote counts and are not reflect in official vote counts for specific candidates or measures	NA	M100 is not a DRE	F, R	VAT has a separate test mode; isolating ballot is procedural
2.5	Post-Voting Functions				
2.5.1	Closing the Polling Place (Precinct Count) These standards for closing the polls are specific to precinct count systems. The system shall provide the means for:				
a.	Preventing the further casting of ballots once the polls has closed	F-M100, R3210		F, R	VAT doesn't close, switched to Off
b.	Provides an internal test that verifies that the prescribed closing procedure has been followed, and that the device status is normal	F-M100, R3210		F, R	
c.	Incorporating a visible indication of system status	F-M100, R3210		F, R	
d.	Producing a diagnostic test record that verifies the sequence of events, and indicates that the extraction of voting data has been activated	F-M100, R3210		F, R	
e.	Precluding the unauthorized reopening of the polls once the poll closing has been completed for that election	F-M100, R3210	M100 reopened with authorization	F, R	DS200 reopened with authorization
2.5.2	Consolidating Vote Data				
	All systems provide a means to consolidate and report vote data from all polling places, and optionally from other sources such as absentee ballots, provisional ballots, and voted ballots requiring human review (e.g., write-in votes).	F-M100, R3210		F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
2.5.3	**Producing Reports**				
	All systems shall be able to create reports summarizing the data on multiple levels.	F-M100, R3210		F, R	
2.5.3.1	Common Standards All systems shall provide capabilities to:				
a.	Support of geographic reporting, which requires the reporting of all results for each contest at the precinct level and additional jurisdictional levels	F-M100, R3210		F, R	
b.	Produce a printed report of the number of ballots counted by each tabulator	F-M100, R3210		F, R	
c.	Produce a printed report for each tabulator of the results of each contest that includes the votes cast for each selection, the count of undervotes, and the count of overvotes	F-M100, R3210	RFI 2007-06	F, R	RFI 2007-06
d.	Produce a consolidated printed report of the results for each contest of all votes cast (including the count of ballots from other sources supported by the system as specified by the vendor) that includes the votes cast for each selection, the count of undervotes, and the count of overvotes	F-M100, R3210	RFI 2007-06	F, R	RFI 2007-06
e.	Be capable of producing a consolidated printed report of the combination of overvotes for any contest that is selected by an authorized official (e.g.; the number of overvotes in a given contest combining candidate A and candidate B, combining candidate A and candidate C, etc.)	F-M100, R3210		F, R	
f.	Produce all system audit information required in Section 4.4 in the form of printed reports, or in electronic memory for printing centrally	F-M100, R3210		F, R	
g.	Prevent data from being altered or destroyed by report generation, or by the transmission of results over telecommunications lines	F-M100, R3210	Disabled M100 telecommunication in Unity 3.2.1.0	F, R	Telecommunications is disabled in Unity 3.2.0.0
2.5.3.2	Precinct Count Systems In addition, all precinct count voting systems shall:				
a.	Prevent the printing of reports and the unauthorized extraction of data prior to the official close of the polling place	F-M100, R3210		F, R	
b.	Provide a means to extract information from a transportable programmable memory device or data storage medium for vote consolidation	F-M100, R3210		F, R	
c.	Consolidate the data contained in each unit into a single report for the polling place when more than one voting machine or precinct tabulator is used	F-M100, R3210		F, R	
d.	Prevent data in transportable memory from being altered or destroyed by report generation, or by the transmission of results over telecommunications lines	F-M100, R3210	Disabled M100 telecommunication in Unity 3.2.1.0	F, R	Telecommunications is disabled in Unity 3.2.0.0
2.5.4	**Broadcasting Results** Some voting systems offer the capability to make unofficial results available to external organizations such as the news				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	media, political party officials, and others. Although this capability is not required, systems that make unofficial results available shall:				
a.	Provide only aggregated results, and not data from individual ballots	F-M100		F	
b.	Provide no access path from unofficial electronic reports or files to the storage devices for official data	F-M100		F	
c.	Clearly indicate on each report or file that the results it contains are unofficial	F-M100		F	
2.6	**Maintenance, Transportation and Storage** All systems shall be designed and manufactured to facilitate preventive and corrective maintenance, conforming to the hardware standards described in Section 3. All vote casting and tally equipment designated for storage between elections shall: a. Function without degradation in capabilities after transit to and from the place of use, as demonstrated by meeting the performance standards described in Section 3 b. Function without degradation in capabilities after storage between elections, as demonstrated by meeting the performance standards described in Section 3. (See Section 3.2)				
3	*Hardware Standards*				
3.2	**Performance Requirements** Performance requirements address a broad range of parameters (see below)				
3.2.1	**Accuracy Requirements** Voting system accuracy addresses the accuracy of data for each of the individual ballot positions that could be selected by a voter, including the positions that are not selected. For a voting system, accuracy is defined as the ability of the system to capture, record, store, consolidate and report the specific selections and absence of selections, made by the voter for each ballot position without error. Required accuracy is defined in terms of an error rate that for testing purposes represents the maximum number of errors allowed while processing a specified volume of data.				RFI 2007-06
a. 1) 2)	For all paper-based voting systems: Scanning ballot positions on paper ballots to detect selections for individual candidates and contests Conversion of selections detected on paper ballots into digital data	F-M100, R3210		F, R	
b. 1) 2)	For all DRE voting systems: Recording the voter selections of candidates and contests into voting data storage Recording voter selections of candidates and contests into ballot image storage independently from voting data storage	NA	M100 is not a DRE	NA	No DRE

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
c. 1)	For precinct-count voting systems (paper-based and DRE): Consolidation of vote selection data from multiple precinct-based voting machines to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data	F-M100, R3210		F, R	
d. 1)	For central-count voting systems (paper-based and DRE): Consolidation of vote selection data from multiple counting devices to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data	F-M100, R3210		F, R	
	For testing purposes, the acceptable error rate is defined using two parameters: the desired error rate to be achieved, and the maximum error rate that should be accepted by the test process. For each processing function indicated above, the voting system shall achieve a target error rate of no more than one in 10,000,000 ballot positions, with a maximum acceptable error rate in the test process of one in 500,000 ballot positions.	F-M100		F, V9	
3.2.2	**Environmental Requirements** All voting systems shall be designed to withstand the environmental conditions contained in the appropriate test procedures of the Standards/Guidelines. These procedures will be applied to all devices for casting, scanning and counting ballots, except those that constitute COTS devices that have not been modified in any manner to support their use as part of a voting system and that have a documented record of performance under conditions defined in the Standards/Guidelines.				
	The Technical Data Package supplied by the vendor shall include a statement of all requirements and restrictions regarding environmental protection, electrical service, recommended auxiliary power, telecommunications service, and any other facility or resource required for the proper installation and operation of the system.	E-M100		E	
3.2.2.1	Shelter Requirements				
	Precinct count systems are designed for storage and operation in any enclosed facility ordinarily used as a warehouse or polling place, with prominent instructions as to any special storage requirements	F-M100		F	
3.2.2.2	Space Requirements				
	The arrangement of the voting system does not impede performance of their duties by polling place officials, the orderly flow of voters through the polling place, or the ability for the voter to vote in private	F-M100		F	
3.2.2.3	Furnishings and Fixtures				
	Any furnishings or fixtures provided as a part of voting systems, and any components provided by the vendor that	F-M100, E-M100		F, E	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	are not a part of the system but that are used to support its storage, transportation, or operation, comply with the design and safety requirements of Subsection 3.4.8.				
3.2.2.4	Electrical Supply Components of voting systems that require an electrical supply shall meet the following standards:				
a.	Precinct count systems operate with the electrical supply ordinarily found in polling places (Nominal 120 Vac/60Hz/1 phase)	E-M100		E	
b.	For components of voting systems that require an electrical supply, central count systems operate with the electrical supply ordinarily found in central tabulation facilities or computer room facilities (120vac/60hz/1, 208vac/60hz/3, or 240vac/60hz/2);	E-M100		E	
c.	All voting machines shall also be capable of operating for a period of at least 2 hours on backup power, such that no voting data is lost or corrupted nor normal operations interrupted. When backup power is exhausted the voting machine shall retain the contents of all memories intact. The backup power capability is not required to provide lighting of the voting area.	E-M100	RFI 2008-02 RFI 2008-06	E	RFI 2008-02 RFI 2008-06
3.2.2.5	Electrical Power Disturbance Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data:		RFI 2008-02 RFI 2008-06		RFI 2008-02 RFI 2008-06
a.	Surges of 30% dip @10 ms;	E-M100		E	
b.	Surges of 60% dip @100 ms & 1 sec	E-M100		E	
c.	Surges of >95% interrupt @5Sec;	E-M100		E	
d.	Surges of + or - 15% line variations of nominal line voltage	E-M100		E	
e.	Electric power increases of 7.5% and reductions of 12.5% of nominal specified power supply for a period of up to four hours at each power level.	E-M100		E	
3.2.2.6	Electrical Fast Transient Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, electrical fast transients of:		RFI 2008-10		RFI 2008-10
a.	2 kV AC & DC External Power lines	E-M100		E	
b.	+ or - 1 kV all external wires > 3 m no control	E-M100		E	
c.	+ or - 2 kV all external wires control.	E-M100		E	
3.2.2.7	Lighting Surge Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, surges of:				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
a.	+ or - 2 kV AC line to line	E-M100		E	
b.	+ or - 2 kV AC line to earth	E-M100		E	
c.	+ or – 0.5 kV DC line to line >10m	E-M100		E	
d.	+ or – 0.5 kV DC line to earth >10m	E-M100		E	
e.	+ or - 1 kV I/O sig/control >30m			E	
3.2.2.8	Electrostatic Disruption				
	The vote scanning and counting equipment for paper-based systems, and all DRE equipment, is able to withstand ±15 kV air discharge and ±8 kV contact discharge without damage or loss of data. The equipment may reset or have momentary interruption so long as normal operation is resumed without human intervention or loss of data. Loss of data means votes that have been completed and confirmed to the voter.	E-M100 NOC 08-001	Reuse of prior testing for the M100	E	
3.2.2.9	Electromagnetic Radiation				
	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, complies with the Rules and Regulations of the Federal Communications Commission, Part 15, Class B requirements for both radiated and conducted emissions	E-M100		E	
3.2.2.10	Electromagnetic Susceptibility				
	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, is able to withstand an electromagnetic field of 10 V/m modulated by a 1 kHz 80% AM modulation over the frequency range of 80 MHz to 1000 MHz, without disruption of normal operation or loss of data	E-M100		E	
3.2.2.11	Conducted RF Immunity Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, conducted RF energy of:				
a.	10V AC & DC power	E-M100		E	
b.	10V, 20 sig/control >3m.	E-M100		E	
3.2.2.12	Magnetic Fields Immunity				
	Vote scanning and counting equipment for paper-based systems, and all DRE equipment, shall be able to withstand, without disruption of normal operation or loss of data, AC magnetic fields of 30 A/m at 60 Hz	E-M100		E	
3.2.2.13	Environmental Control – Operating Environment				
	Equipment used for election management activities or vote counting (including both precinct and central count systems) shall be capable of operation in temperatures ranging from 50 to 95 degrees Fahrenheit.	E-M100		E	
3.2.2.14	Environmental Control – Transit and Storage Equipment used for vote casting or for counting votes in a precinct count system, shall meet these specific minimum				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	performance standards that simulate exposure to physical shock and vibration associated with handling and transportation by surface and air common carriers, and to temperature conditions associated with delivery and storage in an uncontrolled warehouse environment:				
a.	High and low storage temperatures ranging from -4 to +140 degrees Fahrenheit, equivalent to MIL-STD-810D, Methods 501.2 and 502.2, Procedure I-Storage;	E-M100		E	
b.	Bench handling equivalent to the procedure of MIL-STD-810D, Method 516.3, Procedure VI;	E-M100		E	
c.	Vibration equivalent to the procedure of MIL-STD-810D, Method 514.3, Category 1- Basic Transportation, Common Carrier	E-M100		E	
d.	Uncontrolled humidity equivalent to the procedure of MIL-STD-810D, Method 507.2, Procedure I-Natural Hot-Humid.	E-M100		E	
3.2.2.15	Data Network Requirements				
	Voting systems may use a local or remote data network. If such a network is used, then all components of the network shall comply with the telecommunications requirements described in Section 5 and the Security requirements described in Section 6.	S3210, T3210	Network LAN functionality for the EMS	S, T	Network functionality is disabled in the submitted voting system
3.2.3	**Election Management System (EMS) Requirements** The Election Management System (EMS) requirements address electronic hardware and software used to conduct the pre-voting functions defined in Section 2 with regard to ballot preparation, election programming, ballot and program installation, readiness testing, verification at the polling place, and verification at the central location.				
3.2.3.1	Recording Requirements Voting systems shall accurately record all election management data entered by the user, including election officials or their designees.				
a.	Record every entry made by the user;	F-M100, R3210	Unmodified from Unity 3.2.0.0	F, R	
b.	Add permissible voter selections correctly to the memory components of the device;	F-M100, R3210	Unmodified from Unity 3.2.0.0	F, R	
c.	Verify the correctness of detection of the user selections and the addition of the selections correctly to memory	F-M100, R3210	Unmodified from Unity 3.2.0.0	F, R	
d.	Add various forms of data entered directly by the election official or designee, such as text, line art, logos, and images	F-M100	Unmodified from Unity 3.2.0.0	F	
e.	Verify the correctness of detection of data entered directly by the user and the addition of the selections correctly to memory	F-M100, R3210	Unmodified from Unity 3.2.0.0	F, R	
f.	Preserve the integrity of election management data stored in memory against corruption by stray electromagnetic emissions, and internally generated spurious electrical	NA	Unmodified from Unity 3.2.0.0	E	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	signals				
g.	Log corrected data errors by the system.	F-M100, R3210	Unmodified from Unity 3.2.0.0	F, R	
3.2.3.2	Memory Stability Memory devices used to retain election management data shall have demonstrated error-free data retention for a period of 22 months.	Doc Review		TDP	Attestation from ESS
3.2.4	**Vote Recording Requirements**				
3.2.4.1	Common Standards All voting systems shall provide voting booths or enclosures for poll site use. Such booths or enclosures may be integral to the voting system or supplied as components of the voting system, and shall:				
a.	Be integral to, or make provisions for installation of the voting device;	F-M100		F	
b.	Ensure by its structure stability against movement or overturning during entry, occupancy, and exit by the voter	F-M100		F	
c.	Provide privacy for the voter, and be designed in such a way as to prevent observation of the ballot by any person other than the voter	F-M100		F	
d.	Be capable of meeting the accessibility requirements of Subsection 2.2.7.1	F-M100		F	
3.2.4.2	Paper-based Recording Standards The paper-based recording requirements govern: • Ballot cards or sheets, and pages or assemblies of pages containing ballot field identification data • Punching devices • Marking devices • Frames or fixtures to hold the ballot while it is being punched • Compartments or booths where voters record selections • Secure containers for the collection of voted ballots				
3.2.4.2.1	Paper Ballot Standards Paper ballots used by paper-based voting systems shall meet the following standards:				
a.	Paper ballots used by paper-based voting systems shall meet the following standards: Punches or marks that identify the unique ballot format, in accordance with Section 2.3.1.1.1.c., shall be outside the area in which votes are recorded, so as to minimize the likelihood that these punches or marks will be mistaken for vote responses and the likelihood that recorded votes will obliterate these punches or marks	F-M100, R3210	No ballot punches	F, R	No ballot punches
b.	If printed or punched alignment marks are used to locate the vote response fields on the ballot, these marks shall be outside the area in which votes are recorded, so as to minimize the likelihood that these marks will be mistaken for	F-M100, R3210	No ballot punches	F, R	No ballot punches

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	vote responses and the likelihood that recorded votes will obliterate these marks				
c.	The TDP shall specify the required paper stock, size, shape, opacity, color, watermarks, field layout, orientation, size and style of printing, size and location of punch or mark fields used for vote response fields and to identify unique ballot formats, placement of alignment marks, ink for printing, and folding and bleed-through limitations for preparation of ballots that are compatible with the system.	F-M100		F	
3.2.4.2.2	Punching Devices Punching devices used by voting systems shall:				
a.	Be suitable for the type of ballot card specified;	NA	Not a punch card system	NA	Not a punch card system
b.	Facilitate the clear and accurate recording of each vote intended by the voter;	NA	Not a punch card system	NA	Not a punch card system
c.	Be designed to avoid excessive damage to vote recorder components	NA	Not a punch card system	NA	Not a punch card system
d.	Incorporate features to ensure that chad (debris) is removed, without damage to other parts of the ballot card.	NA	Not a punch card system	NA	Not a punch card system
3.2.4.2.3	Marking Devices The Technical Data Package shall specify marking devices (such as pens or pencils) that, if used to make the prescribed form of mark, produce readable marked ballots such that the system meets the performance requirements for accuracy specified previously. These specifications shall identify:				
a.	Specific characteristics of marking devices that affect readability of marked ballots	F-M100		F	
b.	Performance capabilities with regard to each characteristic	F-M100		F	
c.	For marking devices manufactured by multiple external sources, a listing of sources and model numbers that are compatible with the system.	F-M100		F	
3.2.4.2.4	Frames or Fixtures for Punchcard Ballots A frame or fixture for punchcard ballot shall:				
a.	Hold the ballot card securely in the proper location and orientation for voting:	NA	Not a punch card system	NA	Not a punch card system
b.	When contests not directly printed on the ballot card or sheet, incorporate an assembly of ballot label pages that identify offices and issues corresponding to the proper ballot format for the polling place where it is used and are aligned with the voting fields assigned to them	NA	Not a punch card system	NA	Not a punch card system
c.	Incorporate a template to preclude perforation of the card except in the specified voting fields; a mask to allow punches only in fields designated by the format of the ballot; and a backing plate for the capture and removal of chad. The requirement may be satisfied by equipment of a different design as long it achieves the same result as the Standard	NA	Not a punch card system	NA	Not a punch card system

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	with regard to:				
1)	Positioning the card;	NA	Not a punch card system	NA	Not a punch card system
2)	Association of ballot label information with corresponding punch fields;	NA	Not a punch card system	NA	Not a punch card system
3)	Enable only those voting fields that correspond to the format of the ballot; and	NA	Not a punch card system	NA	Not a punch card system
4)	Punching the fields and the positive removal of chad.	NA	Not a punch card system	NA	Not a punch card system
3.2.4.2.5	Frames or Fixtures for Printed Ballots A frame or fixture for printed ballot cards is optional. If such a device is provided, it shall:				
a.	Be of any size and shape consistent with its intended use;	F-M100		F	
b.	Position the card properly;	F-M100		F	
c.	Hold the ballot card securely in its proper location and orientation for voting	F-M100		F	
d.	Comply with the design and construction requirements in Subsection 3.4.	F-M100		F	
3.2.4.2.6	Ballot Boxes and Ballot Transfer Boxes Ballot boxes and ballot transfer boxes which serve as secure containers for the storage and transportation of voted ballots, shall:				
a.	Be of any size, shape, and weight commensurate with their intended use	F-M100		F	
b.	Incorporate locks or seals, and specifications in the system documentation	F-M100, S3210	M100 v.1:2.2.1	F, S	DS200 v.1:2.2.1
c.	Provide specific points where ballots are inserted, with all other points on the box constructed in a manner that prevents ballot insertion	F-M100		F	
d.	For precinct count systems, contain separate compartments for segregating unread ballots, ballots with write-in votes, or irregularities that may require special handling or processing. In lieu of compartments, conversion processing may mark such ballots with an identifying spot or stripe to facilitate manual segregation	F-M100		F	
3.2.4.3	DRE Systems Recording Requirements				
3.2.4.3.1	Activity Indicator DRE systems shall include an audible or visible activity indicator providing the status of each voting device. This indicator shall:				
a.	Indicate whether the device has been activated for voting	NA	M100 is not a DRE	F, R	VAT prompts to insert a ballot
b.	Indicate whether the device is in use.	NA	M100 is not a DRE	F, R	
3.2.4.3.2	DRE System Vote Recording To ensure vote recording accuracy and integrity while				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	protecting the anonymity of the voter, all DRE systems shall:				
a.	Contain all mechanical, electromechanical, and electronic components; software; and controls required to detect and record the activation of selections made by the voter in the process of voting and casting a ballot	NA	M100 is not a DRE	F, R	
b.	Incorporate redundant memories to detect and allow correction of errors caused by the failure of any of the individual memories	NA	M100 is not a DRE	NA	No DRE
c. 1) 2)	Provide at least two processes that record the voter's selections that: • To the extent possible, are isolated from each other • Designate one process and associated storage location as the main vote detection, interpretation, processing and reporting path	NA	M100 is not a DRE	NA	No DRE
	Use a different process to store ballot images, for which the method of recording may include any appropriate encoding or data compression procedure consistent with the regeneration of an unequivocal record of the ballot as cast by the voter.	NA	M100 is not a DRE	NA	No DRE
d.	Provide a capability to retrieve ballot images in a form readable by humans.	NA	M100 is not a DRE	NA	No DRE
e.	Ensure that all processing and storage protects the anonymity of the voter.	NA	M100 is not a DRE	F	
3.2.4.3.3	Recording Accuracy DRE systems meet the following requirements for recording accurately each vote and ballot cast:'				
a.	Detect every selection made by the voter	NA	M100 is not a DRE	F, R	
b.	Correctly add permissible selections to the memory components of the device	NA	M100 is not a DRE	F, R	Temporary memory prior to VAT printing
c.	Verify the correctness of the detection of the voter selections and the addition of the selections to memory	NA	M100 is not a DRE	F, R	
d.	Achieve an error rate not to exceed the requirement indicated in Section 3.2.1	NA	M100 is not a DRE	F	VAT paper ballot marking
e.	Preserve the integrity of voting data and ballot images (for DRE machines) stored in memory for the official vote count and audit trail purposes against corruption by stray electromagnetic emissions, and internally generated spurious electrical signals	NA	M100 is not a DRE	NA	No DRE
f.	Maintain a log of corrected data	NA	M100 is not a DRE	F, R	
3.2.4.3.4	Recording Reliability				
	Recording reliability refers to the ability of the DRE system to record votes accurately at its maximum rated processing volume for a specified period of time. The DRE system shall record votes reliably in accordance with the requirements of Subsection 3.4.3.	NA	M100 is not a DRE	F	VAT paper ballot marking

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
3.2.5	**Paper-based Conversion Requirements**				
3.2.5.1	Ballot Handling				
	Ballot handling consists of a ballot card's acceptance, movement through the read station and transfer into a collection station or receptacle.	F-M100, R3210		F, R	
3.2.5.1.1	Capacity (Central Count)				
	The capacity to convert the marks on individual ballots into signals is uniquely important to central count systems. The capacity for a central count system shall be documented by the vendor. This documentation shall include capacity for individual components that impact the overall capacity.	F-M100, R3210		F, R	
3.2.5.1.2	Exception Handling (Central Count) This requirement refers to the handling of ballots when they are unreadable or some condition is detected requiring that the cards be segregated from normally processed ballots for human review. In response to an unreadable ballot or a write-in vote all central count paper-based systems shall central count paper-based systems shall:				
a. b. c.	Outstack the ballot, or Stop the ballot reader and display a message prompting the election official or designee to remove the ballot, or Mark the ballot with an identifying mark to facilitate its later identification.	F-M100, R3210		F, R	
	Additionally, the system shall a capability that can be activated by an authorized election official to identify ballots containing overvotes, blank ballots, and ballots containing undervotes in a designated race. If enabled, these capabilities shall perform one of the above actions in response to the indicated condition	F-M100, R3210		F, R	
3.2.5.1.3	Exception Handling (Precinct Count) This requirement refers to the handling of ballots for precinct count system when they are unreadable or when some condition is detected requiring that the cards be segregated from normally processed ballots for human review. All paper based precinct count systems shall:				
a.	In response to an unreadable or blank ballot, return the ballot and provide a message prompting the voter to examine the ballot	F-M100, R3210		F, R	
b.	In response to a ballot with a write-in vote, segregate the ballot or mark the ballot with an identifying mark to facilitate its later identification	F-M100, R3210		F, R	
c. 1) 2) 3)	In response to a ballot with an overvote the system shall: • Provide a capability to identify an overvoted ballot • Return the ballot • Provide an indication prompting the voter to examine the	F-M100, R3210		F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
4) 5)	ballot • Allow the voter to correct the ballot • Provide a means for an authorized election official to deactivate this capability entirely and by contest				
d. 1) 2) 3) 4) 5)	In response to a ballot with an undervote, the system shall: • Provide a capability to identify an undervoted ballot • Return the ballot • Provide an indication prompting the voter to examine the ballot • Allow the voter to submit the ballot with the undervote • Provide a means for an authorized election official to deactivate this capability	F-M100, R3210		F, R	
3.2.5.1.4	Multiple Feed Prevention Multiple feed refers to the situation arising when a ballot reader attempts to read more than one ballot at a time. The requirements govern the ability of a ballot reader to prevent multiple feed or to detect and provide an alarm indicating multiple feed.				
a.	If multiple feed is detected, the card reader shall halt in a manner that permits the operator to remove the unread cards causing the error, and reinsert them in the card input hopper	F-M100		F	
b.	The frequency of multiple feeds with ballots intended for use with the system shall not exceed 1 in 10,000	F-M100		F	
3.2.5.2	Ballot Reading Accuracy This paper-based system requirement governs the conversion of the physical ballot into electronic data. Reading accuracy for ballot conversion refers to the ability to: ♦ Recognize vote punches or marks, or the absence thereof, for each possible selection on the ballot ♦ Discriminate between valid punches or marks and extraneous perforations, smudges, and folds ♦ Convert the vote punches or marks, or the absence thereof, for each possible selection on the ballot into digital signals To ensure accuracy, paper-based systems shall:				
a.	Detect punches or marks that conform to vendor specifications with an error rate not exceeding the requirement indicated in Section 3.2.1	F-M100, R3210, V- M100 1, 2, 4, 11, 12		F, R V1,2,4, 6-10	
b.	Ignore, and not record, extraneous perforations, smudges, and folds;	F-M100, R3210		F, R	
c.	Reject ballots that meet all vendor specifications at a rate not to exceed 2 percent.	F-M100, R3210, V- M100 1, 2, 4, 11, 12		F, R, V1,2,4,6-10	1 incidence @ DS200 & M650 prompted for maintenance at iBeta
3.2.6	**Tabulation Processing Requirements**				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
3.2.6.1	Paper-based Processing Requirements				
3.2.6.1.1	Processing Accuracy Processing accuracy refers to the ability of the system to receive electronic signals produced by punches for punchcard systems and vote marks and timing information for marksense systems; perform logical and numerical operations upon these data; and reproduce the contents of memory when required, without error. Specific requirements are detailed below:				
a.	Processing accuracy shall be measured by vote selection error rate, the ratio of uncorrected vote selection errors to the total number of ballot positions that could be recorded across all ballots when the system is operated at its nominal or design rate of processing			See 3.2.6.1.1d	There is no pass/fail criteria in this requirement. It is a definition of processing accuracy
b.	The vote selection error rate shall include data that denotes ballot style or precinct as well as data denoting a vote in a specific contest or ballot proposition	F-M100, R3210		F, R	
c	The vote selection error rate shall include all errors from any source	F-M100, R3210		F, R	
d.	The vote selection error rate shall not exceed the requirement indicated in Subsection 4.1.1	F-M100, R3210, V-M100 1, 2, 4, 11, 12		F, R V1,2,4, 6-10	V1,2,6,7,9,10 - DS200
3.2.6.1.2	Paper-based system memory devices, used to retain control programs and data, shall have demonstrated error-free data retention for a period of 22 months under the environmental conditions for operation and non-operation (i.e. storage).	Doc Review		TDP	Attestation
3.2.6.2	DRE System Processing Requirements The DRE voting systems processing requirements address all mechanical devices, electromechanical devices, electronic devices, and software required to process voting data after the polls are closed.				
3.2.6.2.1	Processing Speed DRE voting systems shall meet the following requirements for processing speed:				
a.	Operate at a speed sufficient to respond to any operator and voter input without perceptible delay (no more than three seconds)	NA	M100 is not a DRE	F	VAT ballot marking; printing exceeds 3 seconds
b.	if the consolidation of polling place data is done locally, perform this consolidation in a time not to exceed five minutes for each device in the polling place	NA	M100 is not a DRE	NA	No DRE
3.2.6.2.2	Processing Accuracy Processing accuracy is defined as the ability of the system to process voting data stored in DRE voting devices or in removable memory modules installed in such devices.				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	Processing includes all operations to consolidate voting data after the polls have been closed. DRE voting systems shall:				
a.	Produce reports that are completely consistent, with no discrepancy among reports of voting device data produced at any level	F-M100, R3210		F, R	
b.	Produce consolidated reports containing absentee, provisional or other voting data that are similarly error-free. Any discrepancy, regardless of source, is resolvable to a procedural error, to the failure of a non-memory device or to an external cause	F-M100, R3210		F, R	
3.2.6.2.3	Memory Stability				
	DRE system memory devices used to retain control programs and data shall have demonstrated error-free data retention for a period of 22 months. Error-free retention may be achieved by the use of redundant memory elements, provided that the capability for conflict resolution or correction among elements is included.	NA	M100 is not a DRE	NA	No DRE
3.2.7	**Reporting Requirements**				
3.2.7.1	Removable Storage Memory				
	All storage media that can be removed from the voting system and transported to another location for readout and report generation, these media shall use devices with demonstrated error-free retention for a period of 22 months under the environmental conditions for operation and non-operation contained in Section 3.2.2. Examples of removable storage media include: programmable read-only memory (PROM), random access memory (RAM) with battery backup, magnetic media or optical media.	Doc Review		TDP Review	Attestation from ESS
3.2.7.2	Printers All printers used to produce reports of the vote count shall be capable of producing:				
a.	Alphanumeric headers	F-M100, R3210		F, R	
b.	Election, office and issue labels	F-M100, R3210		F, R	
c.	Alphanumeric entries generated as part of the audit record.	F-M100, R3210		F, R	
3.2.8	**Vote Data Management Requirements** The vote data management requirements for all systems address capabilities that manage, process, and report voting data after the data has been consolidated at the polling place or other jurisdictional levels. These capabilities allow the system to:				
a.	Consolidate voting data from polling place data memory or transfer devices	F-M100, R3210		F, R	
b.	Report polling place summaries; and	F-M100,		F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
		R3210			
c.	Process absentee ballots, data entered manually, and administrative ballot definition data.	F-M100, R3210		F, R	
	The requirements address all hardware and software required to generate output reports in the various formats required by the using jurisdiction.	F-M100, R3210		F, R	
3.2.8.1	Data File Management All voting systems shall provide the capability to:				
a.	Integrate voting data files with ballot definition files	F-M100, R3210		F, R	
b.	Verify file compatibility.	F-M100, R3210		F, R	
c.	Edit and update files as required.	F-M100, R3210		F, R	
3.2.8.2	Data Report Generation:				
a.	All voting systems shall include report generators for producing output reports at the device, polling place and summary level, with provisions for administrative and judicial subdivision as required by the using jurisdiction	F-M100, R3210		F, R	
3.3	**Physical Characteristics**				
3.3.1	**Size**				
	There is no numerical limitation on the size of any voting equipment, but the size of each voting machine should be compatible with its intended use and the location at which the equipment is to be used.	F-M100	RFI 2007-05	F	RFI 2007-05
3.3.2	**Weight**				
	There is no numerical limitation on the weight of any voting equipment, but the weight of each voting machine should be compatible with its intended use and the location at which the equipment is to be used.	F-M100		F	
3.3.3	**Transport and Storage of Precinct Systems** All precinct voting systems shall:				
a.	Provide a means to safely and easily handle, transport, and install voting equipment, such as wheels or a handle or handles	F-M100		F	No handling issues noted by iBeta
b. 1) 2)	Be capable of using, or be provided with, a protective enclosure rendering the equipment capable of withstanding: Impact, shock and vibration loads associated with surface and air transportation Stacking loads associated with storage	F-M100		F	
3.4	**Design, Construction, and Maintenance Characteristics**				
3.4.1	**Materials Process and Parts** The approach to system design is unrestricted, and may incorporate any form or variant of technology capable of meeting the voting systems requirements and standards.				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	Precinct count systems shall be designed in accordance with best commercial practice for microcomputers, process controllers, and their peripheral components. Central count voting systems and equipment used in a central tabulating environment shall be designed in accordance with best commercial and industrial practice. All voting systems shall:				
a.	Be designed and constructed so that the frequency of equipment malfunctions and maintenance requirements are reduced to the lowest level consistent with cost constraints.	F-M100		F	
b.	Include, as part of the accompanying TDP, an approved parts list	F-M100		F	
c.	Exclude parts or components not included in the approved parts list.	F-M100		F	
3.4.2	Durability				
	All voting systems shall be designed to withstand normal use without deterioration and without excessive maintenance cost for a period of ten years.	F-M100, Doc Review		F, TDP Review	RFI 2008-05 Attestation from ES&S
3.4.3	Reliability				
	The reliability of voting system devices shall be measured as Mean Time Between Failure (MTBF) for the system submitted for testing. MBTF is defined as the value of the ratio of operating time to the number of failures which have occurred in the specified time interval. A typical system operations scenario consists of approximately 45 hours of equipment operation, consisting of 30 hours of equipment set-up and readiness testing and 15 hours of elections operations. For the purpose of demonstrating compliance with this requirement, a failure is defined as any event which results in either the: a. Loss of one or more functions b. Degradation of performance such that the device is unable to perform its intended function for longer than 10 seconds The MTBF demonstrated during certification testing shall be at least 163 hours.	E-M100		E	
3.4.4	**Maintainability** Maintainability represents the ease with which maintenance actions can be performed based on the design characteristics of equipment and software and the processes the vendor and election officials have in place for preventing failures and for reacting to failures. Maintainability includes the ability of equipment and software to self-diagnose problems and make non-technical election workers aware of a problem. Maintainability addresses all scheduled and unscheduled events, which are performed to: • Determine the operational status of the system or a component;			F	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	• Adjust, align, tune, or service components; • Repair or replace a component having a specified operating life or replacement interval; • Repair or replace a component that exhibits an undesirable predetermined physical condition or performance degradation; • Repair or replace a component that has failed; and • Verify the restoration of a component, or the system, to operational status. Maintainability shall be determined based on the presence of specific physical attributes that aid system maintenance activities, and the ease with which system maintenance tasks can be performed by the ITA. Although a more quantitative basis for assessing maintainability, such as the mean to repair the system is desirable, the qualification of a system is conducted before it is approved for sale and thus before a broader base of maintenance experience can be obtained.				
3.4.4.1	Physical Attributes The following physical attributes will be examined to assess reliability:				
a.	Presence of labels and the identification of test points	F-M100		F	
b.	Provision of built-in test and diagnostic circuitry or physical indicators of condition	F-M100		F	
c.	Presence of labels and alarms related to failures	F-M100		F	
d.	Presence of features that allow non-technicians to perform routine maintenance tasks (such as update of the system database)	F-M100		F	
3.4.4.2	Additional Attributes The following additional attributes will be examined to assess maintainability:				
a.	Ease of detecting that equipment has failed by a non-technician	F-M100		F	
b.	Ease of diagnosing problems by a trained technician	F-M100		F	
c.	Low false alarm rates (i.e., indications of problems that do not exist)	F-M100		F	
d.	Ease of access to components for replacement	F-M100		F	
e.	Ease with which adjustment and alignment can be performed	F-M100		F	
f.	Ease with which database updates can be performed by a non-technician	F-M100		F	
g.	Adjust, align, tune or service components	F-M100		F	
3.4.5	Availability- The availability of a voting system is defined as the probability that the equipment (and supporting software) needed to perform designated voting functions will respond to operational commands and accomplish the function. The voting system shall meet the availability standard for each of				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	the following voting functions:				
a.	For all paper-based voting systems:	F-M100		F, E	
1	Recording voter selections (such as by ballot marking or punch)	F-M100		F, E	
2	Scanning the punches or marks on paper ballots and converting them into digital data	F-M100		F, E	
b.	For all DRE systems, recording and storing voter ballot selections	F-M100		F, E	
c.	For precinct count systems (paper-based and DRE), consolidation of vote selection data from multiple precinct based systems to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data	F-M100		F, E	
d.	For central-count systems (paper-based and DRE), consolidation of vote selection data from multiple counting devices to generate jurisdiction-wide vote counts, including storage and reporting of the consolidated vote data	F-M100		F, E	
	System availability is measured as the ratio of the time during which the system is operational (up time) to the total time period of operation (up time plus down time). Inherent availability (Ai) is the fraction of time a system is functional, based upon Mean Time Between Failure (MTBF) and Mean Time To Repair (MTTR), that is: Ai = (MTBF)/(MTBF + MTTR) MTTR is the average time required to perform a corrective maintenance task during periods of system operation. Corrective maintenance task time is active repair time, plus the time attributable to other factors that could lead to logistic or administrative delays, such as travel notification of qualified maintenance personnel and travel time for such personnel to arrive at the appropriate site. Corrective maintenance may consist of substitution of the complete device or one of its components, as in the case of precinct count and some central count systems, or it may consist of on-site repair. The voting system shall achieve at least 99 percent availability during normal operation for the functions indicated above. This standard encompasses for each function the combination of all devices and components that support the function, including their MTTR and MTBF attributes.	F-M100		F, E	
	Vendors shall specify the typical system configuration that is to be used to assess availability, and any assumptions made with regard to any parameters that impact the MTTR. These factors shall include at a minimum:	F-M100		F	
a.	Recommended number and locations of spare devices or components to be kept on hand for repair purposes during periods of system operation	F-M100		F	
b.	Recommended number and locations of qualified	F-M100		F	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	maintenance personnel who need to be available to support repair calls during system operation. Organizational affiliation (i.e., jurisdiction, vendor) of qualified maintenance personnel				
c.	Organizational affiliation (i.e., jurisdiction, vendor) of qualified maintenance personnel	F-M100		F	
3.4.6	**Product Marking** All voting systems shall:				
a.	Identify all devices with a permanently affixed nameplate or label containing the name of the manufacturer or vendor, the name of the device, its part or model number, its revision letter, its serial number, and if applicable, its power requirements	F-M100		F	
b.	Display on each device a separate data plate containing a schedule for and list of operations required to service or to perform preventive maintenance	F-M100		F	
c.	Display advisory caution and warning instructions to ensure safe operation of the equipment and to avoid exposure to hazardous electrical voltages and moving parts at all locations where operation or exposure may occur	F-M100		F	
3.4.7	**Workmanship** To help ensure proper workmanship, all manufacturers of voting systems shall:				
a.	Adopt and adhere to practices and procedures to ensure their products are free from damage or defect that could make them unsatisfactory for their intended purpose	F-M100		F	
b.	Ensure components provided by external suppliers are free from damage or defect that could make them unsatisfactory for their intended purpose.	F-M100		F	
3.4.8	**Safety** All voting systems shall meet the following requirements for safety:				RFI 2008-09
a.	All voting system and their components shall be designed to eliminate hazards to personnel or the equipment itself.	E-M100		E	
b.	Defects in design and construction that can result in personal injury or equipment damage must be detected and corrected before voting systems and components are placed into service.	E-M100		E	
c.	Equipment design for personnel safety is equal to or better than the appropriate requirements of the Occupational Safety and Health Act, Code of Federal Regulations, as identified in Title 29, part 1910	E-M100		E	
3.4.9	**Human Engineering- Controls and Displays** All voting systems and components shall be designed and constructed so as to simplify and facilitate the functions required , and to eliminate the likelihood of erroneous stimuli and responses on the part of the voter or operator. All voting				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	systems shall meet the following requirements for controls and displays:				
a.	In all systems, controls used by the voter or equipment operator shall be conveniently located, shall use designs consistent with their functions, and shall be clearly labeled. Instruction plates are provided, if necessary to avoid ambiguity or incorrect actuation.	F-M100		F	
b.	Information or data displays are large enough to be readable by voters and operators with no disabilities and by voters with disabilities consistent with the requirements defined is Section 2.2.7 of the Standards.	F-M100		F	
c.	Status displays meet the same requirements as data displays, and they shall also follow conventional industrial practice with respect to color:	F-M100		F	
1	Green, blue, or white displays shall be used for indications of normal status;	F-M100		F	
2	Amber indicators shall be used to indicate warnings or marginal status; and	F-M100		F	
3	Red indicators shall be used to indicate error conditions or equipment states that may result in damage or hazard to personnel; and unless the equipment is designed to halt under conditions of incipient damage or hazard, an audible alarm is also be provided.	F-M100		F	
d.	Color coding shall be selected so as to assure correct perception by voters and operators with color blindness; and shall not bet used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element (see Appendix C for suggested references).	F-M100		F	
e.	The system's display does not use flashing or blinking text objects, or other elements having a flash or blink frequency, greater than 2 Hz and lower than 55 Hz			F	
4	**Software Standards**				
4.1.1	**Software Sources**				
4.2	**Source Design and Coding Standards** The software used by voting systems is selected by the vendor and not prescribed by the Standards. This sections provides standards for voting system software with regard to: • Selection of programming languages • Software integrity • Software modularity and programming; • Control constructs; • Naming conventions; • Coding conventions; and • Comment conventions.				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
4.3	**Data and Document Retention** All systems shall:				
a.	Maintain the integrity of voting and audit data during an election, and for at least 22 months thereafter, a time sufficient to resolve most contested elections and support other activities related to the reconstruction and investigation of a contested election	Doc Review		TDP Review	Attestation from ESS
b.	Protect against the failure of any data input or storage device at a location controlled by the jurisdiction or its contractors, and against any attempt at improper data entry or retrieval	S3210, V-M100 4		S, V4	
4.4	**Audit Record Data**				
	Audit trails are essential to ensure the integrity of a voting system. Operational requirements for audit trails are described in Subsection 2.2.5.2 of the Standards. Audit record data are generated by these procedures. The audit record data in the following subsections are essential to the complete recording of election operations and reporting of the vote tally. This list of audit records may not reflect the design constructs of some systems. Therefore, vendors shall supplement it with information relevant to the operation of their specific systems.	F-M100, S3210		F, S	Document review
4.4.1	**Pre-election Audit Records**				
	During election definition and ballot preparation, the system shall audit the preparation of the baseline ballot formats and modifications to them, a description of these modifications, and corresponding dates. The log shall include:	F-M100,R3210		F,R	
a.	The allowable number of selections for an office or issue;	F-M100, R3210		F, R	
b.	The combinations of voting patterns permitted or required by the jurisdiction	F-M100, R3210		F, R	
c.	The inclusion or exclusion of offices or issues as the result of multiple districting within the polling place	F-M100, R3210		F, R	
d.	Any other characteristics that may be peculiar to the jurisdiction, the election, or the polling place's location	F-M100, R3210		F, R	
e.	Manual data maintained by election personnel	F-M100, R3210		F, R	
f.	Samples of all final ballot formats	F-M100, R3210		F, R	
g.	Ballot preparation edits listings.	F-M100, R3210		F, R	
4.4.2	**System Readiness Audit Records** The following minimum requirements apply to system readiness audit records:				
a.	Prior to the start of ballot counting, a system process shall verify hardware and software status and generate a	F-M100, R3210		F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	readiness audit record. This record shall include the identification of the software release, the identification of the election to be processed, and the results of software and hardware diagnostic tests				
b.	In the case of systems used at the polling place, the record shall include polling place identification	F-M100, R3210		F, R	
c.	The ballot interpretation logic shall test and record the correct installation of ballot formats on voting devices	F-M100, R3210		F, R	
d.	The software shall check and record the status of all data paths and memory locations to be used in vote recording to protect against contamination of voting data	F-M100, R3210		F, R	
e.	Upon the conclusion of the tests, the software shall provide evidence in the audit record that the test data have been expunged	F-M100, R3210		F, R	
f.	If required and provided, the ballot reader and arithmetic-logic unit shall be evaluated for accuracy, and the system shall record the results. It shall allow the processing or simulated processing of sufficient test ballots to provide a statistical estimate of processing accuracy	F-M100		F	
g. 1) 2) 3) 4)	For systems that use a public network, provide a report of test ballots that includes: Number of ballots sent When each ballot was sent Machine from which each ballot was sent specific votes or selections contained in the ballot	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
4.4.3	**In-Process Audit Records** In-process audit records document system operations during diagnostic routines and the casting and tallying of ballots. At a minimum, the in-process audit records shall contain:				RFI 2008-07
a.	Machine generated error and exception messages to demonstrate successful recovery. Examples include, but are not necessarily limited to:	V-M100 1, 2, 4, 5, 11, 12	Code Review v.1:4.2.3e	V1-10	Code review v.1:4.2.3e
1)	The source and disposition of system interrupts resulting in entry into exception handling routines	V-M100 1, 2, 4, 5, 11, 12, F-M100, R3210		V1-10. F, R	
2)	All messages generated by exception handlers	V-M100 1, 2, 4, 5, 11, 12, F-M100, R3210		V1-10, F, R	
3)	The identification code and number of occurrences for each hardware and software error or failure	F-M100, $		F, R	
4)	Notification of system login or access errors, file access errors, and physical violations of security as they occur, and a summary record of these events after processing	S3210		S	
5)	Other exception events such as power failures, failure of critical hardware components, data transmission errors or other types of operating anomalies	S3210		S	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
b.	Critical system status messages other than informational messages displayed by the system during the course of normal operations. These items include, but are not limited to:	F-M100, R3210, S3210	v.2: 3.3.1	F, R, S	v.2: 3.3.1
1)	Diagnostic and status messages upon startup	F-M100, R3210		F, R	
2)	The "zero totals" check conducted before opening the polling place or counting a precinct centrally	F-M100, R3210, S3210	v.2: 3.3.1	F, R, S	v.2: 3.3.1
3)	For paper-based systems, the initiation or termination of card reader and communications equipment operation	F-M100, R3210		F, R	
4)	For DRE machines at controlled voting locations, the event (and time, if available) of activating and casting each ballot (i.e., each voter's transaction as an event). This data can be compared with the public counter for reconciliation purposes	NA	M100 is not a DRE	F	VAT ballot printing
c.	Non-critical status messages that are generated by the machine's data quality monitor or by software and hardware condition monitors	F-M100		F	
d.	System generated log of all normal process activity and system events that require operator intervention, so that each operator access can be monitored and access sequence can be constructed	F-M100, R3210, S3210	v.2: 3.3.1	F, R, S	v.2: 3.3.1
4.4.4	**Vote Tally Data** In addition to the audit requirements described above, other election-related data is essential for reporting results to interested parties, the press, and the voting public, and is vital to verifying an accurate count. Voting systems shall meet these reporting requirements by providing software capable of obtaining data concerning various aspects of vote counting and producing printed reports. At a minimum, vote tally data shall include:				
a.	Number of ballots cast, using each ballot configuration, by tabulator, by precinct, and by political subdivision	F-M100, R3210		F, R	
b.	Candidate and measure vote totals for each contest, by tabulator	F-M100, R3210		F, R	
c.	The number of ballots read within each precinct and for additional jurisdictional levels, by configuration, including separate totals for each party in primary elections	F-M100, R3210		F, R	
d.	Separate accumulation of overvotes and undervotes for each contest, by tabulator, precinct and for additional jurisdictional levels (no overvotes would be indicated for DRE voting devices)	F-M100, R3210		F, R	
e.	For paper-based systems only, the total number of ballots both able to be processed and unable to be processed; and if there are multiple card ballots, the total number of cards read	F-M100, R3210		F, R	
	For systems that produce an electronic file containing vote tally data, the contents of the file shall include the same	F-M100, R3210		F, R	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	minimum data cited above for printed vote tally reports.				
4.5	**Voter Secrecy on DRE Systems** All DRE systems shall ensure vote secrecy by:				
a.	Immediately after the voter chooses to cast his or her ballot, record the voter's selections in the memory to be used for vote counting and audit data (including ballot images), and erase the selections from the display, memory, and all other storage, including all forms of temporary storage	NA	M100 is not a DRE	S	Post printing on the VAT
b.	Immediately after the voter chooses to cancel his or her ballot, erase the selections from the display and all other storage, including buffers and other temporary storage	NA	M100 is not a DRE	S	Pre-printing on the VAT
5	**Telecommunications**				
5.2	**Design, Construction, and Maintenance Requirement**				
	Design, construction, and maintenance requirements for telecommunications represent the operational capability of both system hardware and software. These capabilities shall be considered basic to all data transmissions.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
5.2.1	**Accuracy**				
	The telecommunications components of all voting systems shall meet the accuracy requirements of 3.4.1.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
5.2.2	**Durability**				
	The telecommunications components of all voting systems shall meet the Durability requirements of 3.4.2.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
5.2.3	**Reliability**				
	The telecommunications components of all voting systems shall meet the Reliability requirements of 3.4.3.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
5.2.4	**Maintainability**				
	The telecommunications components of all voting systems shall meet the maintainability requirements of 3.4.4.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
5.2.5	**Availability**				
	The telecommunications components of all voting systems shall meet the availability requirements of 3.4.5.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
5.2.6	**Integrity** For WANs using public telecommunications, boundary definition and implementation shall meet the requirements below.				
a.	Outside service providers and subscribers of such providers shall not be given direct access or control of any resource inside the boundary.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
b.	Voting system administrators shall not require any type of	S3210, T3210	Disabled M100	S, T	Telecommunication

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	control of resources outside this boundary. Typically, an end point of a telecommunications circuit will be a subscriber termination on a Digital Service Unit/Customer Service Unit although the specific technology configuration may vary. Regardless of the technology used, the boundary point must ensure that everything on the voting system side is locally configured and controlled by the election jurisdiction while everything on the public network side is controlled by an outside service provider.		telecommunication in Unity 3.2.1.0		s is disabled in Unity 3.2.0.0
c.	The system shall be designed and configured such that it is not vulnerable to a single point of failure in the connection to the public network which could cause total loss of voting capabilities at any polling place.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
5.2.7	**Confirmation** Confirmation occurs when the system notifies the user of the successful or unsuccessful completion of the data transmission, where successful completion is defined as accurate receipt of the transmitted data. To provide confirmation, the telecommunications components of a voting system shall				
d.	Notify the user of the successful or unsuccessful completion of the data transmission; and	S3210, T3210	No network trans-mission; see 2.2.2.1 d & e	S, T	No network trans-mission; see 2.2.2.1 d & e
e.	In the event of unsuccessful transmission, notify the user of the action to be taken.	S3210, T3210	No network trans-mission; see 2.2.2.1 d & e	S, T	No network trans-mission; see 2.2.2.1 d & e
6	**Security Standards**				
6.2	**Access Controls**				
6.2.1	**Access Control Policy**				
6.2.1.1	General Access Control Policy		RFI 2008-03		RFI 2008-03
	Although the jurisdiction in which the voting system is operated is responsible for determining the access policies for each election, the vendor shall provide a description of recommended policies for:	S3210- Doc Review		S- Doc Review	
a.	Software access controls;	S3210- Doc Review		S- Doc Review	
b.	Hardware access controls;	S3210- Doc Review		S- Doc Review	
c.	Communications;	S3210- Doc Review		S- Doc Review	Networking is disabled
d.	Effective password management;	S3210- Doc Review		S- Doc Review	
e.	Protection abilities of a particular operating system;	S3210- Doc Review		S- Doc Review	
f.	General characteristics of supervisory access privileges;	S3210- Doc		S- Doc Review	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
		Review			
g.	Segregation of duties; and	S3210- Doc Review		S- Doc Review	
h.	Any additional relevant characteristics.	S3210- Doc Review		S- Doc Review	
6.2.1.2	Individual Access Privileges Voting system vendors shall:				
a.	Identify each person to whom access is granted, and the specific functions and data to which each person holds authorized access	S3210- Doc Review		S- Doc Review	
b.	Specify whether an individual's authorization is limited to a specific time, time interval or phase of the voting or counting operations	S3210- Doc Review		S- Doc Review	
c.	Permit the voter to cast a ballot expeditiously, but preclude voter access to all aspects of the vote counting processes	S3210- Doc Review		S- Doc Review	
6.2.2	**Access Control Measures** Vendors shall provide a detailed description of all system access control measures designed to permit authorized access to the system and prevent unauthorized access, such as:				
a.	Use of data and user authorization	S3210- Doc Review & R3210E-M100V-M100iE-M100w		S- Doc & Review	
b.	Program unit ownership and other regional boundaries	S3210- Doc Review		S- Doc Review	
c.	One-end or two-end port protection devices	S3210- Doc Review		S- Doc Review	
d.	Security kernels	S3210- Doc Review		S- Doc Review	
e.	Computer-generated password keys	S3210- Doc Review & CodE-M100 R3210E-M100V-M100iE-M100w		S- Doc & Code Review	
f.	Special protocols	S3210- Doc Review		S- Doc Review	
g.	Message encryption and	S3210- Doc Review & CodE-M100 R3210E-M100V-M100iE-M100w		S- Doc & Code Review	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
h.	Controlled access security.	S3210- Doc Review		S- Doc Review	
	Vendors also shall define and provide a detailed description of the methods used to prevent unauthorized access to the access control capabilities of the system itself.	S3210- Doc Review		S- Doc Review	
6.3	**Physical Security Measures**				
	A voting system's sensitivity to disruption or corruption of data depends, in part, on the physical location of equipment and data media, and on the establishment of secure telecommunications among various locations. Most often, the disruption of voting and vote counting results from a physical violation of one or more areas of the system thought to be protected. Therefore, security procedures shall address physical threats and the corresponding means to defeat them.	S3210- Doc Review		S- Doc Review	
6.3.1	**Polling Place Security** For polling place operations, vendors shall develop and provide detailed documentation of measures anticipate and counteract vandalism, civil disobedience, and similar occurrences. The measures shall.				
a.	Allow the immediate detection of tampering with vote casting devices and precinct ballot counters.	S3210- Doc Review		S- Doc Review	
b.	Control physical access to a telecommunications link if such a link is used	S3210- Doc Review		S- Doc Review	
6.3.2	**Central Count Location Security**				
a. b. c. d.	Vendors shall develop and document in detailed measures to be taken in a central counting environment. These measures shall include physical and procedural controls related to the Handling of ballot boxes Preparing of ballots for counting Counting operations and Reporting data	S3210- Doc Review		S- Doc Review	
6.4	**Software Security**				
6.4.1	**Software and Firmware Installation** The system shall meet the following requirements for installation of software, including hardware with embedded firmware.				
a.	If software is resident in the system as firmware, the vendor shall require and state in the system documentation that every device is to be retested to validate each ROM prior to the start of elections operations.	S3210- Doc Review		S- Doc Review	
b.	To prevent alteration of executable code, no software shall be permanently installed or resident in the voting system unless the system documentation states that the jurisdiction must provide a secure physical and procedural environment for the storage, handling, preparation, and transportation of the	S3210		S	

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	system hardware.				
c.	The voting system bootstrap, monitor, and device-controller software may be resident permanently as firmware, provided that this firmware has been shown to be inaccessible to activation or control by any means other than by the authorized initiation and execution of the vote counting program, and its associated exception handlers.	S3210		S	
d.	The election-specific programming may be installed and resident as firmware, provided that such firmware is installed on a component (such as a computer chip) other than the component on which the operating system resides.	S3210		S	
e.	After initiation of election day testing, no source code or compilers or assemblers shall be resident or accessible.	S3210		S	
6.4.2	**Protection Against Malicious Software** Voting systems shall deploy protection against the many forms of threats to which they may be exposed such as file and macro viruses, worms, Trojan horses, and logic bombs				
	Vendors shall develop and document the procedures to be followed to ensure that such protection is maintained in a current status.	S3210		S	
6.5	**Telecommunications and Data Transmission**				
6.5.1	**Access Controls**				
	Voting systems that use telecommunications to communicate between system components and locations are subject to the same security requirements governing access to any other system hardware, software, and data function.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
6.5.2	**Data Integrity**				
	Voting systems that use electrical or optical transmission of data shall ensure the receipt of valid vote records is verified at the receiving station. This should include standard transmission error detection and correction methods such as checksums or message digest hashes. Verification of correct transmission shall occur at the voting system application level and ensure that the correct data is recorded on all relevant components consolidated within the polling place prior to the voter completing casting of his or her ballot.	S3210, T3210	No transmission within the polls prior to voter casting their ballot	S, T	No transmission within the polls prior to voter casting their ballot
6.5.3	**Data Interception Prevention** Voting systems that use telecommunications to communicate between system components and locations before the polling place is officially closed shall:				
a.	Implement an encryption standard currently documented and validated for use by an agency of the U.S. Federal Government and	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
b.	Provide a means to detect the presence of an intrusive process, such as an Intrusion Detection System.	S3210, T3210	Disabled M100 telecommunication	S, T	Telecommunications is disabled in

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
			in Unity 3.2.1.0		Unity 3.2.0.0
6.5.4	**Protection Against External Threats**				
	Voting systems that use public telecommunications networks shall implement protections against external threats to which commercial products used in the system may be susceptible.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
6.5.4.1	Identification of COTS Products				
a. b. c. d.	Voting systems that use public telecommunications networks shall provide system documentation that clearly identifies all COTS hardware and software products and communications services used in the development and/or operation of the voting system, including operating systems, communications routers, modem drivers and dial-up networking software.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
	Such documentation shall identify the name, vendor, and version used for each such component.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
6.5.4.2	Use of Protective Software				
	Voting systems that use public telecommunications networks shall use protective software at the receiving-end of all communications paths to:	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
a.	Detect the presence of a threat in a transmission	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
b.	Remove the threat from infected files/data	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
c.	Prevent against storage of the threat anywhere on the receiving device	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
d.	Provide the capability to confirm that no threats are stored in system memory and in connected storage media	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
e.	Provide data to the system audit log indicating the detection of a threat and the processing performed	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
	Vendors shall use multiple forms of protective software as needed to provide capabilities for the full range of products used by the voting system.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
6.5.4.3	Monitoring and Responding to External Threats				
	Voting system that use public telecommunications networks may become vulnerable, by virtue of their system components, to external threats to the accuracy and integrity of vote recording, vote counting, and vote consolidation and	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	reporting processes. Therefore, vendors of such systems shall document how they plan to monitor and respond to known threats to which their voting systems are vulnerable. This documentation shall provide a detailed description, including scheduling information, of the procedures the vendor will use to:				
a.	Monitor threats, such as through the review of assessments, advisories, and alerts for COTS components issued by the Computer Emergency Response Team (CERT), for which a current listing can be found at http://www.cert.org, the National Infrastructure Protection Center (NIPC), and the Federal Computer Incident Response Capability (FedCIRC), for which additional information can be found at www.uscert.gov	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
b.	Evaluate the threats and, if any, proposed responses	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
c.	Develop responsive updates to the system and/or corrective procedures	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
d.	Submit the proposed response to the test labs and appropriate states for approval, identifying the exact changes and whether or not they are temporary or permanent	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
e.	After implementation of the proposed response is approved by the state, assist clients, either directly or through detailed written procedures, how to update their systems and/or to implement the corrective procedures within the timeframe established by the state	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
f.	Address threats emerging too late to correct the system by:	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
1	Providing prompt, emergency notification to the accredited test labs and the affected states and user jurisdictions	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
2	Assisting client jurisdictions directly or advising them through detailed written procedures to disable the public telecommunications mode of the system	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
3	Modifying the system after the election to address the threat, submitting the modified system to an accredited test lab and the EAC or state certification authority for approval, and assisting client jurisdictions directly or advising them through detailed written procedures, to update their systems and/or to implement the corrective procedures after approval	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
6.5.5	**Shared Operating Environment** Ballot recording and vote counting can be performed in either a dedicated or non-dedicated environment. If ballot recording				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	and vote counting operations are performed in an environment that is shared with other data processing functions, both hardware and software features shall be present to protect the integrity of vote counting and of vote data. Systems that use a shared operating environment shall:				
a.	Use security procedures and logging records to control access to system functions	S3210	EMS LAN	S	Network disabled in Unity 3.2.0.0
b.	Partition or compartmentalize voting system functions from other concurrent functions at least logically, and preferably physically as well	S3210	EMS LAN	S	Network disabled in Unity 3.2.0.0
c.	Control system access by means of passwords, and restrict account access to necessary functions only	S3210	EMS LAN	S	Network disabled in Unity 3.2.0.0
d.	Have capabilities in place to control the flow of information, precluding data leakage through shared system resources	S3210	EMS LAN	S	Network disabled in Unity 3.2.0.0
6.5.6	**Access to Incomplete Election Returns and Interactive Queries** If the voting system provides access to incomplete election returns and interactive inquiries before the completion of the official count, the system shall:				
a.	Be designed to provide external access to incomplete election returns (for equipment that operates in a central counting environment), only if that access for these purposes is authorized by the statutes and regulations of the using agency. This requirement applies as well to polling place equipment that contains a removable memory module or that may be removed in its entirety to a central place for the consolidation of polling place returns	S3210	No access to incomplete returns	S	No access to incomplete returns
b.	Design voting system software and its security environment such that data accessible to interactive queries resides in an external file or database created and maintained by the elections software under the restrictions applying to any other output report:	S3210	No external access	S	No external access
1	The output file or database has no provision for write-access back to the system.	S3210	No write back provision	S	No write back provision
2	Persons whose only authorized access is to the file or database are denied write-access, both to the file or database, and to the system.	S3210	No external access	S	No external access
6.6	**Security for Transmission of Official Data Over Public Communications Networks**				
6.6.1	**General Security Requirements for Systems Transmitting Data Over Public Networks** All systems that transmit data over public telecommunications networks shall:				
a.	Preserve the secrecy of voter ballot selections and prevent anyone from violating ballot privacy	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
b.	Employ digital signatures for all communications between the vote server and other devices that communicate with the server over the network	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
c.	Require that at least two authorized election officials activate any critical operation regarding the processing of ballots transmitted over a public communications network, i.e. the passwords or cryptographic keys of at least two employees are required to perform processing of vote	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
6.6.2	**Voting Process Security for Casting Individual Ballots over a Public Telecommunications Network**				
	Systems designed for transmission of telecommunications over public networks shall meet security standards that address the security risks attendant with the casting of ballots from polling places controlled by election officials using voting devices configured and installed by election officials and/or their vendor or contractor, and using in-person authentication of individual voters.	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
6.6.2.1	Documentation of Mandatory Security Activities Vendors of voting systems that cast individual ballots over a public telecommunications network shall provide detailed descriptions of:				
a.	All activities mandatory to ensuring effective voting system security to be performed in setting up the system for operation, including testing of security before an election	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
b.	All activities that should be prohibited during voting equipment setup and during the time-frame for voting operations, including both the hours when polls are open and when polls are closed	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
6.6.2.2	Capabilities to Operate During Interruption of Telecommunications Capabilities These systems shall provide the following capabilities to provide resistance to interruptions of telecommunications service that prevent voting devices at the polling place from communicating with external components via telecommunications:				
a.	Detect the occurrence of a telecommunications interruption at the polling place and switch to an alternative mode of operation that is not dependent on the connection between polling place voting devices and external system components	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
b.	Provide an alternate mode of operation that includes the functionality of a conventional electronic voting system without losing any single vote	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
c.	Create and preserve an audit trail of every vote cast during the period of interrupted communication and system operation in conventional electronic voting system mode	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
d.	Upon reestablishment of communications, transmit and	S3210, T3210	Disabled M100	S, T	Telecommunication

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	process votes accumulated while operating in conventional electronic voting system mode with all security safeguards in effect		telecommunication in Unity 3.2.1.0		s is disabled in Unity 3.2.0.0
e.	Ensure that all safeguards related to voter identification and authentication are not affected by the procedures employed by the system to counteract potential interruptions of telecommunications capabilities	S3210, T3210	Disabled M100 telecommunication in Unity 3.2.1.0	S, T	Telecommunications is disabled in Unity 3.2.0.0
7	Quality Assurance Requirements				
7.2	General Requirements The voting system vendor is responsible for designing and implementing a quality assurance program to ensure that the design, workmanship, and performance requirements of this standard are achieved in all delivered systems and components. At a minimum, this program shall:				
a.	Include procedures for specifying, procuring, inspecting, accepting, and controlling parts and raw materials of the requisite quality.	F-M100		F	
b.	Require the documentation of the hardware and software development process.	F-M100		F	
c.	Identify and enforce all requirements for:	F-M100		F	
c. 1)	In-process inspection and testing that the manufacturer deems necessary to ensure proper fabrication and assembly of hardware.	F-M100		F	
c. 2)	Installation and operation of software (including firmware).	F-M100		F	
d.	Include the plans and procedures for post-production environmental screening and acceptance testing.	F-M100		F	
e.	Include a procedure for maintaining all data and records required to document and verify the quality inspections and tests.	F-M100		F	
7.3	Components from Third Parties				
	A vendor who does not manufacture all the components of its voting system, but instead procures components as standard commercial items for assembly and integration into a voting system, shall verify that the supplier vendors follow documented quality assurance procedures that are at least as stringent as those used internally by the voting system vendor.	F-M100		F	
7.4	Responsibility for Tests The manufacturer or vendor shall be responsible for:				
a.	Performing all quality assurance tests.	F-M100		F	
b.	Acquiring and documenting test data.	F-M100		F	
c.	2002: Providing test reports for review by the ITA, and to the purchaser upon request.	F-M100		F	
7.5	Parts and Materials Special Tests In order to ensure that voting system parts and materials				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	function properly, vendors shall:				
a.	Select parts and materials to be used in voting systems and components according to their suitability for the intended application. Suitability may be determined by similarity of this application to existing standard practice, or by means of special tests.	F-M100		F	
b.	Design special tests, if needed, to evaluate the part or material under conditions accurately simulating the actual operating environment.	F-M100		F	
c.	Maintain the resulting test data as part of the quality assurance program documentation.	F-M100		F	
7.6	Parts and Materials Special Tests The vendor performs conformance inspections to ensure the overall quality of the voting system and components delivered to the ITA for testing and to the jurisdiction for implementation. To meet the conformance inspection requirements the vendor or manufacturer shall::				
a.	Inspect and test each voting system or component to verify that it meets all inspection and test requirements for the system.	Observe	M100 on-site maintenance by ES&S tech	F	
b.	Deliver a record of tests or a certificate of satisfactory completion with each system or component.	Observe	M100 on-site maintenance by ES&S tech	F	
7.7	Documentation Vendors are required to produce documentation to support the development and formal testing of voting systems. To meet documentation requirements, vendors shall provide complete product documentation with each voting systems or components, as described Volume II, Section 2 for the TDP. This documentation shall:				
a. b. c	Be sufficient to serve the needs of the ITA, voters, election officials, and maintenance technicians; Be prepared and published in accordance with standard industrial practice for information technology and electronic and mechanical equipment; and Consist, at a minimum, of the following: 1) System overview; 2) System functionality description; 3) System hardware specification; 4) Software design and specifications; 5) System security specification; 6) System test and verification specification; 7) System operations procedures;	Doc Review		F	Letter of reuse; Appendix C for LogMonitor
8	Configuration Management				
8.1	Scope				
8.1.1	Configuration Management Requirements				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	Configuration management addresses a broad set of record keeping, audit, and reporting activities that contribute to full knowledge and control of a system and its components. These activities include:				
	▪ Identifying discrete system components.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
	▪ Creating records of a formal baseline and later versions of components.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review Inconsistencies in CM observed in testing were noted #143 & 160
	▪ Controlling changes made to the system and its components.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review Inconsistencies in CM observed in testing were noted #143 & 160
	▪ Releasing new versions of the system to ITAs.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review Inconsistencies in CM observed in testing were noted #143 & 160
	▪ Releasing new versions of the system to customers.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
	▪ Auditing the system, including its documentation, against configuration management records.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
	▪ Controlling interfaces to other systems.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
	▪ Identifying tools used to build and maintain the system.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
8.1.2	Organization of Configuration Management Standards				
8.1.3	Application of Configuration Management Standards Requirements for configuration management apply regardless of the specific technologies employed to all voting systems subject to the Standards. These system components include:				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
a.	Software components.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Hardware components.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
c.	Communications components.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
d.	Documentation.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
e.	Identification and naming and conventions (including changes to these conventions) for software programs and data files.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
f.	Development and testing artifacts such as test data and scripts.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
g.	File archiving and data repositories.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
8.2	Configuration Management Policy The vendor shall describe its policies for configuration management in the TDP. This description shall address the following elements				
a.	Scope and nature configuration management program activities.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Breadth of the application of the vendor's policies and practices to the voting system. (i.e. extent to which policies and practices apply to the total system and extent to which polices and practices of suppliers apply to particular components, subsystems, or other defined system elements.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
8.3	Configuration Identification				
8.3.1	Structuring and Naming Configuration Items The vendor shall describe the procedures and conventions used to:				
a.	Classify configuration items into categories and subcategories.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Uniquely number or otherwise identify configuration items.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
c.	Name configuration items.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
					Review
8.3.2	Version Conventions When a system component is used to identify higher-level system elements, a vendor shall describe the conventions used to:				
a.	Identify the specific versions of individual configuration items and sets of items that are used by the vendor to identify higher level system elements such as subsystems.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Uniquely number or otherwise identify versions.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
c.	Name versions.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
8.4	Baseline, Promotion and Demotion Procedures The vendor shall establish formal procedures and conventions for establishing and providing a complete description of the procedures and related conventions used to:				
a.	Establish a particular instance of a component as the starting baseline.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Promote subsequent instances of a component to baseline status as development progresses through to completion of the initial completed version released to the ITAs for qualification testing.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
c.	Promote subsequent instances of a component to baseline status as the component is maintained throughout its life cycle until system retirement (i.e., the system is no longer sold or maintained by the vendor).	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
8.5	Configuration Control Procedures Configuration control is the process of approving and implementing changes to a configuration item to prevent unauthorized additions, changes, or deletions. The vendor shall establish such procedures and related conventions, providing a complete description of those procedures used to:				
a.	Develop and maintain internally developed items.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Acquire and maintain third-party items.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
c.	Resolve internally identified defects for items regardless of their origin.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
d.	Resolve externally identified and reported defects (i.e., by	F-M100	Unmodified from	F	Letter of Reuse

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	customers and ITAs).		Unity 3.2.0.0		PCA Document Review
8.6	Release Process Procedures The release process is the means by which the vendor installs, transfers, or migrates the system to the ITAs and, eventually, to its customers. The vendor shall establish such procedures and related conventions, providing a complete description of those used to:				
a.	Perform a first release of the system to:	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Perform a subsequent maintenance or upgrade release of the system, or a particular components, to:	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
c.	Perform the initial delivery and installation of the system to a customer, including confirmation that the installed version of the system matches exactly the certified system version.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
d.	Perform a subsequent maintenance or upgrade release of the system, or a particular component, to a customer, including confirmation that the installed version of the system matches exactly the qualified system version.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
8.7	Configuration Audits				
8.7.1	Physical Configuration Audit The PCA is conducted by the ITA to compare the voting system components submitted for qualification to the vendor's technical documentation. For the PCA, a vendor shall provide:				
a.	Identification of all items that are to be a part of the software release.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Specification of compiler (or choice of compilers) to be used to generate executable programs.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
c.	Identification of all hardware that interfaces with the software.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
d.	Configuration baseline data for all hardware that is unique to the system.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
e.	Copies of all software documentation intended for distribution to users, including program listings, specifications, operations manual, voter manual, and maintenance manual.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
f.	User acceptance test procedures and acceptance criteria.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
g.	Identification of any changes between the physical	F-M100	Unmodified from	F	Letter of Reuse

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	configuration of the system submitted for the PCA and that submitted for the FCA, with a certification that any differences do not degrade the functional characteristics.		Unity 3.2.0.0		PCA Document Review
h.	Complete descriptions of its procedures and related conventions used to support this audit by:	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
h. 1)	Establishing a configuration baseline of the software and hardware to be tested.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
h. 2)	Confirming whether the system documentation matches the corresponding system components.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
8.7.2	Functional Configuration Audits The FCA is conducted by the ITA to verify that the system performs all the functions described in the system documentation. The vendor shall:				
a.	Completely describe its procedures and related conventions used to support this audit for all system components.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Provide the following information to support this audit:	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b. 1)	Copies of all procedures used for module or unit testing, integration testing, and system testing.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b. 2)	Copies of all test cases generated for each module and integration test, and sample ballot formats or other test cases used for system tests.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b. 3)	Records of all tests performed by the procedures listed above, including error corrections and retests.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
	In addition to such audits performed by ITAs during the system qualification process, elements of this audit may also be performed by state election organizations during the system certification process, and individual jurisdictions during system acceptance testing.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
8.8	Configuration Management Resources Often, configuration management activities are performed with the aid of automated tools. Assuring that such tools are available throughout the system life cycle, including if the vendor is acquired by or merged with another organization, is critical to effective configuration management. Vendors may choose the specific tools they use to perform the record keeping, audit, and reporting activities of the configuration management standards. The resources documentation standard provided below focus on assuring that procedures				

VSS 2002	Certification Test Requirements:	Unity 3.2.1.0	Comment	Unity 3.2.0.0	Comment
	are in place to record information about the tools to help ensure that they, and the data they contain, can be transferred effectively and promptly to a third party should the need arise. Within this context, a vendor is required to develop and provide a complete description of the procedures and related practices for maintaining information about:				
a.	Specific tools used, current version, and operating environment specifications.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
b.	Physical location of the tools, including designation of computer directories and files.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review
c.	Procedures and training materials for using the tools.	F-M100	Unmodified from Unity 3.2.0.0	F	Letter of Reuse PCA Document Review

8.2 Appendix B Environmental Test Report Matrix

Hardware testing of the DS200, M650 and AutoMARK Voter Assist Terminals is found in Appendix D section 7.4.5 of the Unity 3.2.0.0 Test Report. Authorization for reuse of the M100 Hardware Environmental test results from the SysTest Unity 4.0 test effort was granted in the 8/04/09 EAC Letter of Reuse. The letter stipulated that iBeta examine the test results provided by SysTest to confirm that:

- A report documenting the equipment passed was provided which addresses the Environmental Hardware testing to the requirements of the 2002 VSS
- Any reported test failures or anomaly mitigations were documented with an appropriate manufacturer Engineering Change Order (ECO)

M100 Environmental Hardware Test Report Matrix

1) Advance Product Testing Test Service Report APT Job # 06-00329 (Final Approval 7/21/06) (Sun Microsystems APT)
   - Discrepancy #27- the report identifies neither pass/fail results nor the specific test standards.
2) EMC Qualification Test Report Election Systems and Software Voting System, M100 060530-1050 6/29/06 (Criterion)
   - Discrepancy #28 is closed- mitigation occurred in the RF Immunity Test (Stewart part No. 28S0670-000 flat split type ferrite placed on ribbon cable close to J8). There is no identification in the report of the issuance of an Engineering Change corresponding to the mitigation. The issue was closed when ES&S has provided ECO 682.
3) Certificate of Compliance ESS-0806-R06-COC Electrical Safety Testing to UL 60950-1: 2007 7/20/08 (Compliance Integrity Services)
4) SysTest Electrical Supply Rev 01 TE1 7/11/08
5): EMC Qualification Test Report Election Systems and Software Voting System, M100 Precinct Count Scanner 080424-1241 5/15/08 (Criterion)
   - See Discrepancy #1 - the M100 ESD test report does not identify the equipment serial number
   - See Discrepancy #2 - there is no connection between the M100 ESD test report and documentation of mitigation conducted during testing.

M100 Equipment	Test Equipment	MIL STD 810 D 516.3 Bench Handling	514.3 Cat 1 Vibration	502 Low Temp	501 High Temp	507-2 Humidity	501 & 502 Temp & Pow Var Accur & 163 hr Reliability	EMC Electromag Rad Part 15 Class B	Power Disturb 61000-4-11	ESD 61000-4-2	Electromag Susct 61000-4-3	Elec Fast Trans 61000-4-4	Lightening Surge 61000-4-5	RF Immunity 61000-4-6	Magnetic Fields Immunity 61000-4-8	VSS Electrical Supply v.1 3.2.2.4.c	OSHA Safety Title 29, Part 1910
M100	Report 1: 3 units: SN 11263, 012603, 010694	Pending response to #27	Pending response to #27	Pending response to #27	Pending response to #27	Pending response to #27	Pending response to #27										
M100	Report 2: 1 Unit SN 11263							#28 pass	#28 pass	#28 pass	#28 pass	#28 pass	#28 pass	#28 pass	#28 pass		
M100	Report 3: Ballot Scanner: Class I (Grounding required for electrical safety), Cord Connected, Indoor Use Only, Pollution Degree 2, and Installation Category II. Ballot box: Class 3 (Plug-socket SELV power from the Ballot																pass

M100		MIL STD 810 D						EMC								VSS	OSHA
Equipment	Test Equipment	516.3 Bench Handling	514.3 Cat 1 Vibration	502 Low Temp	501 High Temp	507-2 Humidity	501 & 502 Temp & Pow Var Accur & 163 hr Reliability	Electromag Rad Part 15 Class B	Power Disturb 61000-4-11	ESD 61000-4-2	Electromag Susct 61000-4-3	Elec Fast Trans 61000-4-4	Lightening Surge 61000-4-5	RF Immunity 61000-4-6	Magnetic Fields Immunity 61000-4-8	Electrical Supply v.1.3.2.4.c	Safety Title 29, Part 1910
	Scanner), Indoor Use Only																
M100	Report 4: SN #: 015483 Fully Charged Battery															pass	
M100	Report 5: ES&S withdrew this report. The M100 shall be resubmitted for ESD testing to conform with NOC 2008-01									#1 & 2 with-drew							

The information in this section is provided by the EAC to outline their process for reuse

8.3 Appendix C EAC Reuse of Testing Review Process

Due to the suspension of accreditation of a VSTL this project was moved from that VSTL to iBeta as requested by ES&S and approved by the EAC. This very unusual circumstance required that a transition plan be developed for the orderly transition of the project. A number of factors impacted the development of this transition plan.

The overriding consideration had to be that the quality of the evaluation meets the EAC's standards for excellence and that any decision to certify the system be clearly based on rigorous and thorough testing. If other legitimate concerns could also be met then every attempt was made to do so. Among those considerations was the timely evaluation of the system, avoiding duplicative testing that provided little real value and supporting the needs of election officials for improvements and upgrades.

In developing a transition plan a number of factors were taken into consideration:

1. The quality of testing already performed was evaluated. In some cases iBeta was directed to review or audit that testing. Another factor was the probability that testing to be performed by iBeta would identify any system issues that may have been missed in prior testing. In some cases iBeta was directed to modify the testing it would do to provide additional checks and redundancy in areas of particular concern.

2. Prior versions of this system are in wide use. In addition individual states and other organizations have conducted their own, independent evaluation of either this exact system or very similar prior versions. This provides a significant body of information from both experience in actual elections and testing performed for other purposes.

All these sources of information were used in developing the transition plan. A risk assessment was made and a transition plan approved. This plan allowed for reuse of some testing, reuse of some testing after an audit and recommendation by iBeta, and requirements for further testing or correlated testing by iBeta. The results of this evaluation were communicated to ES&S and iBeta in several E-Mails and letters between November 2008 and letters dated August 4, 2009 and September 11, 2009. In those communications the following was approved:

1. All hardware testing was approved for reuse.
2. The source code review was approved after a 3% audit and recommendation for reuse by iBeta.
3. The Volume, Stress, Error Recovery and Security test methods and testing had not yet been completed. Accordingly iBeta was to perform this testing on the Unity 3.2.1.0 system.

A new test plan for the Unity 3.2.1.0 system was prepared by iBeta using applicable areas from the Unity v.4.0.0.0 test plan

Determination of reuse of the Functional, Accessibility, Maintainability, Accuracy, and Reliability testing is pending the EAC Technical Reviewer's assessment of the test summary reports provided by SysTest on the M100.

8.4 Appendix D Unity v.4.0.0.0 EAC Approved SysTest Test Plan

The approved *ES&S Unity 4.0 Voting System Test Plan Rev. 10* submitted is found on the Test Plans Approved by the EAC section of the EAC website. (http://www.eac.gov/program-areas/voting-systems/voting-system-certification/test-plans)

8.5 Appendix E EAC Certified Unity 3.2.0.0 Test Report

The *Election Systems & Software Unity 3.2.0.0 Voting System VSTL Certification Test Report (V)2009-30Jun-001(D) v.4.0* and *Election Assistance Commission Voting System Test Summary Report Summary of test Report for testing through 10/22/08 for Election Systems & Software (ES&S), Unity 4.0 Voting System Report Number 07-V-ESS-035-CTP-01 rev. 0.3* are found in the Approved Test Report section of the EAC web site (http://www.eac.gov/program-areas/voting-systems/voting-system-certification/test-reports).