NASED

PRELIMINARY TEST REPORT

Attached is the preliminary test report for Sequoia WinEDS 3.1.038

This report is submitted for NASED review by CIBER Inc.on June 16, 2006.

Signed:

Next steps:

1. NASED Technical Review Committee evaluates the report.
2. Comments and questions by the Committee to the ITA.
3. ITA revises the report, if necessary.
4. The review and revision process continues until the report satisfactorily completes the review process.
5. NASED issues a Qualification Number only after the review and revision process is completed.
6. ITA issues Final Report.

Software Qualification Test Report
Sequoia WinEDS 3.1.038

Original Report Version 1.0 for WinEDS 3.1.038 created 2006-06-16
Report Version 1.1 created 2006-06-20 corrected report reference

Prepared For:

The National Association of State Election Directors

Prepared By:

CIBER, Inc.
Independent Test Authority

ciber

Report revision history

Version	Description
Version 1.0	Original release
Version 1.1	Corrected reference to Wyle report for MPR
Version 1.2	Corrected reference to HAAT from 1.069L to 1.0.79L

1 INTRODUCTION

CIBER is pleased to submit this report summarizing the qualification testing of the Sequoia WinEDS 3.1.038 voting system.

1.1 Test Agency Test Agency History And Capability

CIBER Inc. has been providing IT consulting services for over 20 years. Although the Independent Test Authority (ITA) division name has changed due to an aggressive acquisition and merger market, the ITA division of the company has had the same leadership in place since inception. Founded in 1974, the company's consultants now serve client businesses from 60 CIBER, 10 DigiTerra, 5 Solution Partners and 4 Enspherics offices in the U.S., Canada and Europe. With offices in 10 countries, CIBER's 6,000 IT specialists continuously build, test and upgrade our client's systems to "competitive advantage status." CIBER provides a single source for IT solutions, including:

Full-solution ASP services
Applications maintenance and support
- Testing and IQA
- Web and database hosting
- Enterprise solutions, including SAP, Oracle and Peoplesoft
- Application outsourcing
- eBusiness, from architecture through execution
- Knowledge management and training

The company has been involved in numerous QA and IQA testing projects for commercial, state, and federal government customers. CIBER has an interim accreditation as an ITA through the National Association of State Election Directors (NASED).

1.2 Document Overview

This document consists of five main sections: Introduction, Qualification Test Background, System Identification, System Overview, and Qualification Test Results. The Qualification Background gives general information about the qualification test process. The System Identification Section gives information about the Sequoia software and supporting hardware. The System Overview describes the software and the Qualification Test Results Section provides a summary of the results of the testing process.

Detailed information including the Technical Data Package (TDP) Review, Source Code Review, Functional Test Review and Witness Compile are included as appendices to this report.

2 QUALIFICATION TEST BACKGROUND

The primary purpose of Software Qualification Testing is to demonstrate compliance with levels of design, performance, and quality claimed for them by manufacturers. The tests are also intended to demonstrate that the system meets or exceeds the requirements of the Federal Election Commission (FEC) 2002 Voting System Standards (VSS).

The scope and detail of the requirements for qualification have been tailored to the design and complexity of the software submitted by Sequoia for testing. The qualification test procedure is intended to discover defects in software design and system operation which, should they occur in actual election use, could result in failure to complete election operations in a satisfactory manner.

The tests have been designed to evaluate system compliance to the 2002 FEC Voting System Standards (VSS). The evaluation includes selective in-depth examination of software, the inspection and evaluation of system documentation and optional tests verifying system performance and function under normal and abnormal conditions.

A definition of terms and nomenclature found in the Sequoia voting system is listed below:

WinEDS	Application used to design and print ballots and to produce reports.
Optech Insight & Insight Plus	Optical Paper Ballot Scanner
Edge model I & II	DRE voting device
400C	Optical Paper Ballot Scanner
Card Activator	Device used to create cards for voters
HAAT	(Hybrid Activator Accumulator and Transmitter) Device used to create cards for voters and to consolidate results and print consolidation reports.
VVPAT	(Voter Verifiable Paper Audit Trail) printer attached to the Edge models I & II that provides a paper audit of a voters selections.
OBW	Optech Ballot Wizard is used to lay out the ballot and create ballot pages, visio documents and PDF files.
SPR	Smart Pack Reader is a software component that runs on the WinEDS Server and receives unofficial voting results that are transmitted by the Optech Insight. It puts these results in a file that is accessible to WinEDS.

3 SYSTEM IDENTIFICATION

The system submitted by Sequoia consisted of the previously certified system version 3.1.012 with the following changes:

- **Tally Support for the Smart Pack Reader (SPR) Host**

  WinEDS 3.1 038 includes a data migration process for importing unofficial tally results from the Smart Pack Reader (SPR) Host. Election results are transmitted from precinct-based Insight ballot counters configured with internal modems to a centralized Smart Pack Reader Host. The WinEDS data migration process then loads the Insight precinct results into the WinEDS election database for near real-time reporting of combined unofficial election night results.

- **Support for Arizona Style Candidate Rotation**

  WinEDS 3.1.038 supports the Arizona style candidate rotation whereby candidates of the same party in a general election N of M contest rotate within their party. The rotation includes an algorithm that adjusts the rotation based on registered voter population data so that each rotation is viewed by an equal number of voters. Additional reports are added to present the rotation that show the population totals for each rotation.

- **Verification of vote tally results provided on memory cartridge**
  WinEDS 3.1.038 uses a checksum value to validate each vote total transferred to the central tally facility. The system produces a report of files that were detected with invalid checksum values.

The SPR changes included modifications to the Optech Insight firmware and implementation of data transfer via modem to the SPR host. Wyle Laboratories performed the functional testing of the changes to the Optech Insight (Wyle Report 52125-05). CIBER Performed TDP and Source code reviews and conducted functional and system testing of software changes.

The system submitted by Sequoia for qualification testing consisted of the following software source code components. These components when compiled create the WinEDS Version 3.1.038:

Sequoia Software
The following components were built from source code that CIBER had reviewed and then placed in the CIBER archive. CIBER copied the source code from its Archive to the vendors development computer and then witnessed the vendor build each component

Component	Sub Components	Installed Components
OCX	3rd - Third Party Serial I/O library used w/ OCX to communicate with the MPR. version 1.0.1.2	WSC32.DLL
	AcvAdvProp version 1.1.2.3	AvcAdvProp.cpl
	avccore version 1.2.10.5	AvcCore.ocx
	avcedge version 1.2.19.8	AvcEdge.ocx
	ScriptWiz version 2.1.7.6	ScriptWiz.exe
	Seq400c version 1.2.6.3	Seq400c.ocx
	seqmpr version 1.0.10.1	SeqMpr.ocx
	spvutil version 1.2.9.1	Spvutil.dll
	Spv400c version 1.2.21.2	Spv400c.dll
	Svsmpr version 1.0.23.3	Svsmpr.dll
PB 3.1.038	Archive, audio, blt, blt_dw, cart, config, e_setup, edge, gen, InEagle, main, pfl_dw, profile, reports, rpt_arg, rpt_elec, rpt_nst, rpt_pfl, rpt_pst,rpt_rslt, schlr, sec, seqlV, stats, tally, TS, util	WinEDS31.exe archive.pbd audio.pbd ballots.pbd ballots_dw.pbd cartridge.pbd configuration.pbd edge.pbd election_setup.pbd generation.pbd ineagle.pbd main.pbd pfcapsrv.pbd pfcdwsrv.pbd pfcmain.pbd pfcutil.pbd pfcwnsrv.pbd pfeapsrv.pbd pfedwsrv.pbd pfemain.pbd pfeutil.pbd pfewnsrv.pbd profile.pbd profile_dw.pbd reports.pbd reports_election.pbd reports_nested.pbd reports_post.pbd reports_profile.pbd reports_results.pbd

		report_argument.pbd scheduler.pbd security.pbd sequoia400.pbd statistics.pbd tally.pbd toolsmith.pbd utilities.pbd
Other COTS	EzMr.exe and ezUSB.sys Cypress Semiconductor Corporation	Driver for Advantage Cartridge Reader. Not part of this release. Needed to complete witness build.
	GraphicsProcessor2002 and GraphicsProcessor2002effect GDIPlus Aurigma Imaging Technology, www.aurigma.com.	Used by the application for scaling of bitmap images (graphical languages)
	NCTAudioFile.dll NCTAudioPlayer.dll NCTAudioRecord.dll NCTAudioTransform.dll NCTTextToAudio.dll NCTSoft www.NTCSoft.com	The NCT third party controls are used by the WinEDS application to manage audio recordings and to convert text to speech.
SQL 3.1.038		SQL tables, triggers, stored procedures and functions
VB 3.1.038	CommonBAS, Contest Preview, ContestPreviewEdge, Header, HeaderEdge, Layout, LayoutEdge	ContestPreview.dll ContestPreviewEdge.dll Header.dll HeaderEdge.dll Layout.dll LayoutEdge.dll Setup_Resources.exe
Insight CPX 1.14		EE.ABS

The following software was provided to the vendor as trusted builds from the ITA
archive. These components were installed in the devices used in this test under the
oversight of CIBER. The following table identifies the version and source for each
component.

Software Component	Version	Source

OBW 1.1	1.1	CIBER Archive
SPR Host	1.09	CIBER Archive
400-C/WinETP	1.12.4	Wyle Laboratories Archive
Sequoia Edge Firmware	5.0.24	Wyle Laboratories Archive
HAAT Firmware	1.0.79L	Systest Archive
Advantage Firmware	10.1.9	Wyle Laboraties Archive
Insight APX	2.10	Wyle Laboratories Archive
Insight HPX	1.42	Wyle Laboratories Archive
Card Activator	5.0.21	Wyle Laboratories Archive

The following components are installed on the WinEDS Workstations and Server and are required by the WinEDS System.

Cots Software

Microsoft Windows XP with SP2
Microsoft Windows Server 2003 with SP1
Microsoft Visio 2002
Adobe Acrobat Professional 6.0
Microsoft Office 2003 SP1
Microsoft Vision 2002 SP2
Microsoft SQL Server SP3a

The system submitted by Sequoia for qualification testing consisted of the following hardware components:

Sequoia Hardware

Optech Insight & Insight Plus HPX K1.42, APX K2.10 (Wyle Report 52125-03)
Optech Insight CPX 1.14 (Wyle Report 52125-05)
Insight Memory Pack Receiver 2.15 (Wyle Report 50932-03)
Edge I 5.0.24 (Wyle report 51884-07)
Edge II 5.0.24 (Wyle report 51884-07)
Edge Audio Unit 5.0 (Wyle report 51884-07)
VVPAT 4.3 (Wyle report 51884-07)
400C 3.00P/winetp 1.12.4 (Wyle report 52125-04)
Card Activator 5.0.21 (Wyle report 51884-07)
HAAT Model 50 1.0.79L (Systest report Rev 05b, March 14, 2006)
Sequoia Advantage 10.1.9 (Wyle report 51884-09)

Wyle Laboratories and SysTest Labs performed qualification testing of the above hardware, which is documented in thier reports. The following reports are attached:

> Wyle Report Number 52125-03   Wyle Report Number 51884-07
> Wyle Report Number 52125-04   Wyle Report Number 51884-09
> Wyle Report Number 52125-05
> Systest Report for HAAT Version 1.0.79L, March 14, 2006, Rev. 04b

Please refer to these reports for a description of the hardware and functional testing performed by Wyle and Systest.

COTS Hardware

Dell Latitude 610
Dell Optiplex 280
SYSCARD Technology PCCextend Cardbus
HP LaserJet 1200

The documentation submitted by Sequoia for review testing consisted of the following:

Part No.	Document	Release/ Version	Month/Yr
89352411	WinEDS Change Release Summary	3.1 Ver. 1.05	May 2006
89351511	WinEDS For AVC Edge/Advantage TDP	3.1 Ver. 1.08	June 2006
89350011	WinEDS For AVC Edge/Advantage System Overview	3.1 Ver. 1.12	May 2006
89351111	WinEDS 3.1 For AVC Edge/Advantage Functional Specification	3.1 Ver. 1.11	May 2006
89350211	WinEDS Software Specification	3.1 Ver. 1.09	May, 2006
96051201	WinEDS Test & Verification Specification	3.1 Ver. 1.03	May 2006
89352011	WinEDS Sample Reports	3.1 Ver. 2.07	June 2006
89351211	WinEDS For AVC Edge/Advantage System Database	3.1 Ver. 1.13	May 2006
------	WinEDS 3.1 Reference Guide	3.1 Ver. 6.05	May 2006
190-32556-00	SPR Host for Optech Eagle/Insight Functional Specification	3.1 Ver. 1.03	December, 2004
190-32555-00	SPR Host for Optech Eagle/Insight System Overview	3.1 Ver. 1.03	December, 2004
190-32406-00	SPR Host for Optech Eagle/Insight Operators Manual	3.1 Ver. 1.05	December, 2004
---------	WinEDS 3.1 Installation Guide	3.1 Ver. 1.03	June, 2006
--------	WinEDS 3.1 FEC X-ref		May, 2006

4 SYSTEM OVERVIEW

The Sequoia Voting System supports both paper ballots and electronic voting. The client applications are executed on a standard PC configured with a Windows XP and the server applications are executed on a standard PC configured with Windows server 2003. The following peripherals are connected to client PC:

- Laser printer for printing election ballots and reports
- MPR for reading/writing Insight & Insight Plus cartridges
- Card reader/writer for accessing Edge I & II cartridges

The user defines a ballot using the WinEDS application on the PC. The definition can include a selection of foreign languages and audio for visually disadvantaged voters. Ballot definitions are written to the flash Memory for the 400C, the MPR for the Optech Insight and Insight Plus and the results cartridge for the Edge model I & II.

The Sequoia system provides an early election capability that allows the various devices to accept votes for a specified time period before Election Day.

The Optech Insight and Optech Insight Plus are polling place paper ballot scanners that scan paper ballots and records the selections as ballot images to the MPR. The Optech Insight and Optech Insight Plus are used for Absentee, Early and Election Day polling place voting. The Optical Insight provides the option to incorporate a modem for transmitting unofficial election results to the SPR

The Edge I and Edge II are DRE type voting machines. These devices can be configured to have either a standard thermal printer attached for reporting or a VVPAT which allow the voter to view their selections on paper before casting their ballot. The VVPAT also serves as a report printer.

The 400C is a paper based optical scanner. The 400C can be configured as an absentee, central count or Election Day modes.

5 QUALIFICATION TEST RESULTS

5.1 Technical Data Package (TDP) Review Summary

The vendor submitted changes to the version 3.1.012 WinEDS TDP. The ITA verified that those changes conformed to the 2002 FEC Standards and that they were accurate and complete. These TDP documents served as the basis for verifying the Software Test Plan that was used for functional testing.

The review included reconciling the document changes to the changes that were observed in the source code and functional testing to ensure that the TDP fully describes the updated system. The TDP includes both the HAAT 100 and the HAAT 50 in its description of HAAT functionality. This test included only the HAAT 50 which is not capable of the consolidation and Transmission features described for the HAAT 100.

Upon final review of the aforementioned documents, CIBER concludes that the TDP submitted Sequoia meets the requirements under the FEC standards of 2002.

5.2 Source Code Review Summary

The code was reviewed in order to evaluate its compliance with the FEC standards for source code. These standards are intended to ensure that the overall objectives of the logical correctness, system integrity, reliability, and accuracy are being met. It was also reviewed for its adherence to any Sequoia coding standards.

The review process compared version 3.1.038 code to the previously certified version 3.1.012 source code to identify all changes. The modules containing these changes were then manually inspected to verify that the changes complied with the FEC 2002 Standard.

It was determined that Sequoia WinEDS 3.1.038 meets the standards required by the 2002 VSS.

5.3 Functional Test Summary

The main goal of functional testing was to verify that the changes submitted with this release of WinEDS operate correctly, do not create any adverse effects and that the entire WinEDS system conforms to the FEC standards and to the vendor's stated capabilities. The software that was tested consisted of two installations of the WinEDS 3.1.038 application. One installation was placed on the PC running Windows 2003 server and one installation on PC's (workstations) running Windows XP. The Sequoia WinEDS 3.1.012 had been certified under the 2002 Federal Standard and this testing focused on the changes to that system and. The testing included end-to-end tests that provided a regression test of the WinEDS Application operating in a integrated system configuration that included the hardware and software components identified in Section 3.

The functional testing observed operational characteristics of the SPR and Advantage which were not identified in the TDP (See Appendix C).

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After completion of final functional testing, CIBER concludes that Sequoia WinEDS 3.1.038 Voting System meets the functional requirements provided by the 2002 VSS as well as the additional requirements stated or derived from the TDP.

5.4   Recommendation For Qualification

It has been demonstrated through the TDP review, source code review, and functional testing that the Sequoia WinEDS 3.1.038 successfully meets the required acceptance criteria of the FEC Voting System Standards of 2002. The following notes list three items that were encountered in testing and are not described in the TDP:

1. Only HAAT 50 was exercised in this test, the HAAT 100 was not tested. (See Paragraph 5.1)
2. The first SPR execution after a reboot ignored file creation parameters. (See Appendix C)
3. The Advantage misprinted a party name (See Appendix C)

It is upon completion of this testing that CIBER recommends to the NASED committee that Sequoia WinEDS 3.1.038 be certified.

Pages 11 through 77 of the 6/16/06 Ciber WinEDS 3.1.038 Report have been redacted because they contain trade secrets of Sequoia including proprietary source code and related materials.