

WYLE REPORT NO. T56285-01

APPENDIX A.5

TELECOMMUNICATIONS

TEST CASE PROCEDURE SPECIFICATIONS (T56285-50)

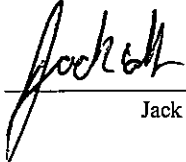
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**TELECOMMUNICATIONS
TEST CASE PROCEDURE SPECIFICATION
FOR
UNISYN VOTING SOLUTIONS, INC.
OPENELECT VOTING SYSTEM, VERSION 1.0**

Prepared by:

 12-29-09

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NVLAP LAB CODE 300771-0

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1.0 INTRODUCTION

The purpose of the Telecommunications Test Case Procedure Specification is to document the “Telecommunications” functionality of the Unisyn OpenElect Voting System (OVS), version 1.0. Wyle must verify that the OVS performs as documented in the Unisyn supplied Technical Data Package submitted to Wyle for the test campaign. Wyle must also validate that the OVS meets the requirements of the 2005 EAC Voluntary Voting Systems Guidelines (VVSG). Wyle qualified personnel will use this document as the procedure to execute the “Telecommunications” test.

1.1 Scope

The scope of this procedure will focus on the telecommunications technologies used in the Unisyn OpenElect Voting System (OVS). The OVS uses telecommunications for the transmission of data during pre-voting and post voting activities. The OVS employs telecommunication technology during ballot definition and vote accumulation. Capabilities shall be provided that ensure data is transmitted with no alteration or unauthorized disclosure during transmission. All telecommunication transmissions used by OVS employ Hypertext Transfer Protocol over Secure Socket Layer (https) on a closed private Local Area Network (LAN). Public networks are not used as part of the OVS system. The specific applications of the OVS used in this test suite are:

- Election Server (ES)
- Software Server (SS)
- Tabulator Client (TC)
- Tabulator
- OpenElect Voting Central Scan (OVCS)

1.2 References

The documents listed below were used in the development of the Test Plan and are utilized to perform certification testing.

- Election Assistance Commission 2005 Voluntary Voting System Guidelines, Volume I, Version 1.0, “Voting System Performance Guidelines”, and Volume II, Version 1.0, “National Certification Testing Guidelines”, dated December 2005
- Election Assistance Commission Testing and Certification Program Manual, Version 1.0, effective date January 1, 2007
- Election Assistance Commission Voting System Test laboratory Program Manual, Version 1.0, effective date July 2008
- National Voluntary Laboratory Accreditation Program NIST Handbook 150, 2006 Edition, “NVLAP Procedures and General Requirements (NIST Handbook 150)”, dated February 2006
- National Voluntary Laboratory Accreditation Program NIST Handbook 150-22, 2008 Edition, “Voting System Testing (NIST Handbook 150-22)”, dated May 2008
- United States 107th Congress Help America Vote Act (HAVA) of 2002 (Public Law 107-252), dated October 2002
- Wyle Laboratories’ Quality Assurance Program Manual, Revision 4

1.0 INTRODUCTION (continued)

1.2 References (continued)

- ANSI/NCSS Z540-1, “Calibration Laboratories and Measuring and Test Equipment, General Requirements”
- ISO 10012-1, “Quality Assurance Requirements for Measuring Equipment”
- EAC Requests for Interpretation (listed on www.eac.gov)
- EAC Notices of Clarification (listed on www.eac.gov)

1.3 Terms and Abbreviations

The terms and abbreviations relevant to the test campaign are described in Table 1-1, below.

Table 1-1 Terms and Abbreviations

Term	Abbreviation	Definition
Commercial Off the Shelf	COTS	---
United States Election Assistance Commission	EAC	Commission created per the Help America Vote Act of 2002, assigned the responsibility for setting voting system standards and providing for the voluntary testing and certification of voting systems.
Election Management System	EMS	Within the OpenElect system, the EMS equivalent is OCS.
Election Server	ES	A component of the OCS, the ES updates the system clock and downloads new Election data to the voting devices prior to each election, typically at the warehouse.
Equipment Under Test	EUT	---
OpenElect Central Suite	OCS	Set of applications supplied by Unisyn to run at the Election Headquarters to support elections on the OVO, OVI, and OVCS systems. Includes: Ballot Layout Manager, Election Manager, Election Server, Tabulator Client, Tabulator Server and Tabulator Reports. In addition, the OCS includes the Software Server (SS) system for updating and validating OVO and OVI (voting device) software.
OpenElect Voting Device	OVD	OVD refers to the OVO, OVI, and OVCS hardware components of the OpenElect Voting System.
OpenElect Voting Interface	OVI	The OVI is an accessible voting device designed to accommodate voters with disabilities, and may also be used for Early Voting.
OpenElect Voting Optical Scan	OVO	The OVO is a ballot scanning and tabulation device which is located at a precinct and may also be used for Early Voting purposes.
OpenElect Voting System	OVS	The OVS is a voting system which is comprised of the OVS suite of software applications, and the OVO and OVI client machines used by voters to produce and cast ballots.

1.0 INTRODUCTION (continued)

1.3 Terms and Abbreviations (continued)

Table 1-1 Terms and Abbreviations (continued)

Software Server	SS	The SS application is used for the updating and validation of Certified Software Releases which are installed on OVS client machines.
OpenElect Voting Central Scan	OVCS	The OVCS is a COTS ballot scanning device that uses proprietary software to capture ballot images.
Tabulator Client	TC	The TC is a software application that retrieves vote files from the TM and transfers the files to the Tabulator.
Tabulator		Tabulator is a software application that receives uploaded voting data.

1.4 Relationship to Other Procedures

The Telecommunications Test Case Procedure Specification is a specific procedure to ES, SS, TC, and Tabulator. No other test procedures need to be run concurrent with this procedure. Telecommunications testing was continuously performed during the all hardware testing of the OVS. See Table 2-1.

2.0 DETAILS

The following sections describe the requirements that are applicable to the OVS and individual test cases that will be run in to facilitate telecommunications testing.

Table 2-1 Telecommunication Requirements

Section	Requirement
VI-2.1.9	Transmission of data during pre-voting, voting or post-voting activities includes capabilities to ensure data are transmitted with no alternation or unauthorized disclosure during transmission for: <ul style="list-style-type: none"> • Ballot Definition • Vote Count
VI-4.1.2.15	When a voting system uses a local or remote data network all components of the network comply with the telecommunications requirements described in Section 6 and the Security requirements described in Section 7.
VI-6.2.1	Telecommunications components meet the accuracy requirements of Subsection 4.1.1.
VI-6.2.2	Telecommunications components meet the durability requirements of Subsection 4.3.2.
VI-6.2.3	Telecommunications components meet the reliability requirements of section 4.3.3.
VI-6.2.4	Telecommunications components meet the maintainability requirements of section 4.3.4.
VI-6.2.5	Telecommunications components meet the availability requirements of section 4.3.5.
VI-6.2.7	The telecommunications components of a voting system shall notify the user of the successful or unsuccessful completion of the data transmission.
VI-7.5.1	a 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.

2.0 DETAILS (CONTINUED)

Table 2-1 Telecommunication Requirements (continued)

V17.5.1	b	Voting systems that use telecommunications to communicate between system components and locations before the polling place is officially closed shall: i. Implement an encryption standard currently documented and validated for use by an agency of the U.S. government ii. Provide a means to detect the presence of an intrusive process, such as an Intrusion Detection System.
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2.1 Inputs, Outputs, and Special Requirements

Input data used during telecommunications testing will be created as pre-test activity and provided for telecommunications testing. The following data will be utilized from previous testing:

Election Server (ES):

Gen 01, Prim 01, and Volume & Stress (V&S) election data packages sent to both the OVO and OVI using telecommunication technology and verification the data is exactly the same.

Software Server (SS):

OVO software versions 0.6.5 and 0.6.99 and OVI software versions 0.3.3 and 0.2.2 will be transmitted using telecommunication technology and verification that the data is exactly the same.

Tabulator Client:

Gen 01, Prim 01, and Volume & Stress (V&S) vote data packages from the OVO will be transmitted using telecommunication technology to Tabulator and verification that the data is exactly the same.

The outputs from the telecommunication testing will not be used in other testing.

Wyle will ensure that confirmation (visual or otherwise) occurs when the OVS has notified the user of the successful completion or unsuccessful completion of data transmission during the telecommunications test.

2.2 Hardware Testing

Telecommunications testing is in part based on testing performed earlier in the test campaign. Telecommunications was used during the accuracy, durability, reliability, maintainability, and availability testing. Due to the system architecture, none of these tests could have been performed without the use of telecommunications technology. The expected results from these tests would not have been met if telecommunications were not working properly.

2.3 Functional Telecommunication Testing

The OVS system architecture employs a hardened version of CentOS as an operating system. This poses many obstacles to testing the telecommunication transmission. Wyle determined that capturing the actual data packet would require too many modifications to the operating system to be a valid test. Some of these obstacles were closed ports, the absence of protocols, and employing encryption algorithms. The strategy Wyle employed in designing the telecommunication test was to take a digital signature of the data package being sent, transmit the package, and verify the digital signature of the data package on the receiving end. See Attachment A for the detailed procedures for the Telecommunication Test.

ATTACHMENT A
TELECOMMUNICATION TEST CASES

Test Case: Elections Server (ES) Telecommunication Testing of the OVO	
VVSG Requirements	V1-2.1.9 Ballot Definition, V1-4.1.2.15, V1-6.2.2, V1-6.2.3, V1-6.2.5, V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the ES portion of the OVS. Election data will be transmitted using telecommunications technologies and verified that the data is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Election data Gen01 will be transmitted from the OCS to the OVO. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS and ES loaded OVO voting machine UNI000004 24-port Linksys Switch
Special Requirements	Under the root's home/OVO/Election folder, the files must be deleted. Under the root's home/OVO/Sounds folder, the files must be deleted. These files must be deleted every time a new election is loaded onto the OCS laptop.
Assumptions	The OVO machine is turned on after the ES has started. The same election Gen01 is loaded onto the OVO and OCS machines. The TM is cleaned. The OCS machine is communicating with the OVO machine via the switch.
Step	Procedure
0	Record the election version of the data being used on the OCS. Make sure the same election is being used on the OVO.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the OCS laptop.
10020	Create a new folder 'OVO' in the root's home folder if that folder is not present. In the 'OVO' folder create two new folders 'Election' and 'Sounds' if they are not present. If these folders are already present, make sure there are no files in these folders
10030	Insert the Gen01 election CD into the OCS laptop. Copy election.zip from the Gen01 CD to the new folder 'Election'. Copy sounds.zip from the Gen01 CD to the new folder 'Sounds'.
10040	Extract Election.zip into the 'Election' folder. An Election.zip_FILES folder will be created. Copy the contents of this folder directly into the 'Election' folder. Extract Sounds.zip into the 'Sounds' folder. A Sounds.zip_FILES folder will be created. Copy the contents of this folder directly into the 'Sounds' folder.
10050	Delete the Election.zip_FILES folder. Delete the Election.zip file from the 'Election' folder. Delete the Sounds.zip_FILES folder. Delete the Sounds.zip file from the 'Sounds' folder.
10060	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder.
10070	Open a terminal and run OVO_MD5_Check.sh script with the input being the extracted election data files from step 10040 . ./OVO_MD5_Check.sh /root/OVO/Election/ > /root/Desktop/verifier/data/gen01election.sig ./OVO_MD5_Check.sh /root/OVO/Sounds/ > /root/Desktop/verifier/data/gen01sounds.sig This will create two signature files 'gen01election.sig' and 'gen01sounds.sig'
10080	Edit the sig files 'gen01election.sig' and 'gen01sounds.sig'. Open the files and replace /root with , and click replace all.
10090	Launch ES from the root login on the OCS. cd /OCS/ElectionServer java -ms50M -mx400M -jar ElectionServer.jar Login as maintenance. Turn the OVO machine on.

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	Make sure that the OVO and OCS are communicating.
10100	Open a terminal and start the Unisyn system verifier. cd /root/Desktop/verifier java -jar SystemVerifier.jar
10110	In the Unisyn system verifier select the 'gen01election.sig' file from the select signature file drop down menu. Hostname is the 192.168.0.4 of the OVO and the password is verifier password for the OVO. Connect. Verify All twice.
10120	In the Unisyn system verifier select the 'gen01sounds.sig' file from the select signature file drop down menu. Hostname is the 192.168.0.4 of the OVO and the password is verifier password for the OVO. Connect. Verify All twice.
Criteria for Evaluation of the Test Results The results of this test will be accepted if the recorded checksum is the same as the derived checksum in the Unisyn system verifier. There should be no errors in the status column of the Unisyn system verifier. Any errors in the system verifier need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Elections Server (ES) Telecommunication Testing of the OVO	
VVSG Requirements	V1-2.1.9 Ballot Definition, V1-4.1.2.15, V1-6.2.2, V1-6.2.3, V1-6.2.5, V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the ES portion of the OVS. Election data will be transmitted using telecommunications technologies and verified that the data is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Election data Volume & Stress will be transmitted from the OCS to the OVO. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS and ES loaded OVO voting machine UNI000004 24-port Linksys Switch
Special Requirements	Under the root's home/OVO/Election folder, the files must be deleted. Under the root's home/OVO/Sounds folder, the files must be deleted. These files must be deleted every time a new election is loaded onto the OCS laptop.
Assumptions	The OVO machine is turned on after the ES has started. The same election Volume & Stress is loaded onto the OVO and OCS machines. The TM is cleaned. The OCS machine is communicating with the OVO machine via the switch.
Step	Procedure
0	Record the election version of the data being used on the OCS. Make sure the same election is being used on the OVO.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the OCS laptop.
10020	Create a new folder 'OVO' in the root's home folder if that folder is not present. In the 'OVO' folder create two new folders 'Election' and 'Sounds' if they are not present. If these folders are already present, make sure there are no files in these folders
10030	Insert the Volume & Stress election CD into the OCS laptop. Copy Election.zip from the Volume & Stress CD to the new folder 'Election'. Copy Sounds.zip from the Volume & Stress CD to the new folder 'Sounds'.
10040	Extract Election.zip into the 'Election' folder. An Election.zip_FILES folder will be created. Copy the contents of this folder directly into the 'Election' folder. Extract Sounds.zip into the 'Sounds' folder. A Sounds.zip_FILES folder will be created. Copy the contents of this folder directly into the 'Sounds' folder.
10050	Delete the Election.zip_FILES folder. Delete the Election.zip file from the 'Election' folder. Delete the Sounds.zip_FILES folder. Delete the Sounds.zip file from the 'Sounds' folder.
10060	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder.
10070	Open a terminal and run OVO_MD5_Check.sh script with the input being the extracted election data files from step 10040 . ./OVO_MD5_Check.sh /root/OVO/Election/ > /root/Desktop/verifier/data/volelection.sig ./OVO_MD5_Check.sh /root/OVO/Sounds/ > /root/Desktop/verifier/data/volsounds.sig This will create two signature files 'volelection.sig' and 'volsounds.sig'
10080	Edit the sig files 'volelection.sig' and 'volsounds.sig'. Open the files and replace ./root with , and click replace all.
10090	Launch ES from the root login on the OCS. cd /OCS/ElectionServer java -ms50M -mx400M -jar ElectionServer.jar Login as maintenance. Turn the OVO machine on.

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	Make sure that the OVO and OCS are communicating.
10100	Open a terminal and start the Unisyn system verifier. cd /root/Desktop/verifier java -jar SystemVerifier.jar
10110	In the Unisyn system verifier select the 'volelection.sig' file from the select signature file drop down menu. Hostname is the 192.168.0.4 of the OVO and the password is verifier password for the OVO. Connect. Verify All twice.
10120	In the Unisyn system verifier select the 'volounds.sig' file from the select signature file drop down menu. Hostname is the 192.168.0.4 of the OVO and the password is verifier password for the OVO. Connect. Verify All twice.
Criteria for Evaluation of the Test Results The results of this test will be accepted if the recorded checksum is the same as the derived checksum in the Unisyn system verifier. There should be no errors in the status column of the Unisyn system verifier. Any errors in the system verifier need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Elections Server (ES) Telecommunication Testing of the OVI	
VVSG Requirements	V1-2.1.9 Ballot Definition, V1-4.1.2.15, V1-6.2.2, V1-6.2.3, V1-6.2.5, V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the ES portion of the OVS. Election data will be transmitted using telecommunications technologies and verified that the data is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Election data Gen01 will be transmitted from the OCS to the OVI. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS and ES loaded OVI voting machine UNI50003 24-port Linksys Switch
Special Requirements	Under the root's home/Unisyn/Election folder, the files must be deleted. Under the root's home/Unisyn/Sounds folder, the files must be deleted. These files must be deleted every time a new election is loaded onto the OVS laptop.
Assumptions	The OVI machine is turned on after the ES has started. The same election Gen01 is loaded onto the OVI and OCS machines. The OCS machine is communicating with the OVI machine via the switch.
Step	Procedure
0	Record the election version of the data being used on the OCS. Make sure the same election is being used on the OVI.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the OCS laptop.
10020	Create a new folder 'Unisyn' in the root's home folder if that folder is not present. In the 'Unisyn' folder create two new folders 'Election' and 'Sounds' if they are not present. If these folders are already present, make sure there are no files in these folders
10030	Copy Election.zip from the Gen01 CD to the new folder 'Election'. Copy sounds.zip from the Gen01 CD to the new folder 'Sounds'.
10040	Extract Election.zip into the 'Election' folder. An Election.zip_FILES folder will be created. Copy the contents of this folder directly into the 'Election' folder. Extract Sounds.zip into the 'Sounds' folder. A Sounds.zip_FILES folder will be created. Copy the contents of this folder directly into the 'Sounds' folder.
10050	Delete the Election.zip_FILES folder. Delete the Election.zip file from the 'Election' folder. Delete the Sounds.zip_FILES folder. Delete the Sounds.zip file from the 'Sounds' folder.
10060	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder
10070	Open a terminal and run the OVO_MD5_Check.sh script with the input being the extracted election data files from step 10040 . ./OVO_MD5_Check.sh /root/Unisyn/Election/ > /root/Desktop/verifier/data/gen01election.sig ./OVO_MD5_Check.sh /root/Unisyn/Sounds/ > /root/Desktop/verifier/data/gen01sounds.sig This will create two signature files 'gen01election.sig' and 'gen01sounds.sig'
10080	Edit the sig files 'gen01election.sig' and 'gen01sounds.sig'. Open the files and replace ./root with , and click replace all.
10090	Open a terminal and launch ES from the root login on the OCS. cd /OCS/ElectionServer java -ms50M -mx400M -jar ElectionServer.jar Login as maintenance. Turn the OVI machine on. Make sure that the OVI and OCS are communicating.

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10100	Open a terminal and start the Unisyn system verifier. cd /root/Desktop/verifier java -jar SystemVerifier.jar
10110	In the Unisyn system verifier select the 'gen01election.sig' file from the select signature file drop down menu. Hostname is the 192.168.150.3 of the OVI and the password is verifier password for the OVI. Connect. Verify All twice.
10120	In the Unisyn system verifier select the 'gen01sounds.sig' file from the select signature file drop down menu. Hostname is the 192.168.150.3 of the OVI and the password is verifier password for the OVI. Connect. Verify All twice.
Criteria for Evaluation of the Test Results The results of this test will be accepted if the recorded checksum is the same as the derived checksum in the Unisyn system verifier. There should be no errors in the status column of the Unisyn system verifier. Any errors in the system verifier need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Elections Server (ES) Telecommunication Testing of the OVI	
VVSG Requirements	V1-2.1.9 Ballot Definition, V1-4.1.2.15, V1-6.2.2, V1-6.2.3, V1-6.2.5, V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the ES portion of the OVS. Election data will be transmitted using telecommunications technologies and verified that the data is accurate and unchanged during the transmission.	Laptop with OVS and root login capabilities. Election data Volume & Stress will be transmitted from the OCS to the OVI. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS and ES loaded OVI voting machine UNI50003 24-port Linksys Switch
Special Requirements	Under the root's home/Unisyn/Election folder, the files must be deleted. Under the root's home/Unisyn/Sounds folder, the files must be deleted. These files must be deleted every time a new election is loaded onto the OVS laptop.
Assumptions	The OVI machine is turned on after the ES has started. The same election Volume & Stress is loaded onto the OVI and OCS machines. The OCS machine is communicating with the OVI machine via the switch.
Step	Procedure
0	Record the election version of the data being used on the OCS. Make sure the same election is being used on the OVI.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the OCS laptop.
10020	Create a new folder 'Unisyn' in the root's home folder if that folder is not present. In the 'Unisyn' folder create two new folders 'Election' and 'Sounds' if they are not present. If these folders are already present, make sure there are no files in these folders
10030	Copy Election.zip from the Volume & Stress CD to the new folder 'Election'. Copy sounds.zip from the Volume & Stress CD to the new folder 'Sounds'.
10040	Extract Election.zip into the 'Election' folder. An Election.zip_FILES folder will be created. Copy the contents of this folder directly into the 'Election' folder. Extract Sounds.zip into the 'Sounds' folder. A Sounds.zip_FILES folder will be created. Copy the contents of this folder directly into the 'Sounds' folder.
10050	Delete the Election.zip_FILES folder. Delete the Election.zip file from the 'Election' folder. Delete the Sounds.zip_FILES folder. Delete the Sounds.zip file from the 'Sounds' folder.
10060	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder
10070	Open a terminal and run OVO_MD5_Check.sh script with the input being the extracted election data files from step 10040 . ./OVO_MD5_Check.sh /root/Unisyn/Election/ > /root/Desktop/verifier/data/volelection.sig ./OVO_MD5_Check.sh /root/Unisyn/Sounds/ > /root/Desktop/verifier/data/volsounds.sig This will create two signature files 'volelection.sig' and 'volsounds.sig'
10080	Edit the sig files 'volelection.sig' and 'volsounds.sig'. Open the files and replace ./root with , and click replace all.
10090	Open a terminal and launch ES from the root login on the OCS. cd /OCS/ElectionServer java -ms50M -mx400M -jar ElectionServer.jar Login as maintenance. Turn the OVI machine on. Make sure that the OVI and OCS are communicating.
10100	Open a terminal and start the Unisyn system verifier.

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	<code>cd /root/Desktop/verifier</code> <code>java -jar SystemVerifier.jar</code>
10110	In the Unisyn system verifier select the 'volelection.sig' file from the select signature file drop down menu. Hostname is the 192.168.150.3 of the OVI and the password is verifier password for the OVI. Connect. Verify All twice.
10120	In the Unisyn system verifier select the 'volounds.sig' file from the select signature file drop down menu. Hostname is the 192.168.150.3 of the OVI and the password is verifier password for the OVI. Connect. Verify All twice.
Criteria for Evaluation of the Test Results The results of this test will be accepted if the recorded checksum is the same as the derived checksum in the Unisyn system verifier. There should be no errors in the status column of the Unisyn system verifier. Any errors in the system verifier need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Software Server (SS) Telecommunication Testing of the OVO	
VVSG Requirements	V1-4.1.2.15,V1-6.2.2, V1-6.2.3, V1-6.2.5,V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the SS portion of the OVS. A software release will be transmitted using telecommunications technologies and verified that the software is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Software release 0.6.5 will be transmitted from the OCS to the OVO. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS, ES, and SS loaded OVO voting machine UNI000004 24-port Linksys Switch
Assumptions	The OVO machine is turned on after the SS has started. The TM is cleaned. The OCS machine is communicating with the OVO machine via the switch.
Step	Procedure
0	Record the release version of the software being used on the OCS.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the OCS laptop.
10020	Create new folder 'software' on the desktop.
10030	Insert the software release 0.6.5 CD into the OCS laptop. Copy Release.zip from the 0.6.5 CD to the new folder 'software'.
10040	Extract Release.zip into the 'software' folder. A Release.zip_FILES folder will be created. Open the Release.zip_FILES folder and copy the 'OVO' folder to the 'root's home' folder. Make sure there is an 'OC' and an 'OS' folder in the 'OVO' folder.
10050	Delete 'software' folder.
10060	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder.
10070	Open a terminal and run OVO_MD5_Check.sh script with the input being the extracted software folder from step 10040 . ./OVO_MD5_Check.sh /root/OVO > /root/Desktop/verifier/data/ovosoft.sig This will create signature file 'ovosoft.sig'
10080	Edit the sig file 'ovosoft.sig'. Open the file and replace /root with , and click replace all.
10090	Launch SS from the root login on the OCS. cd /OCS/SoftwareServer java -ms50M -mx400M -jar SoftwareServer.jar Type the release key. Turn the OVO machine on and type in the validator password. The OVO machine will load the software from the OCS machine. Verify the release version is 0.6.5 Turn the OVO machine off.
10100	Launch ES from the root login on the OCS. cd /OCS/ElectionServer java -ms50M -mx400M -jar ElectionServer.jar Turn the OVO machine on. Make sure that the OVO and OCS are communicating.
10110	Open a terminal and start the Unisyn system verifier. cd /root/Desktop/verifier java -jar SystemVerifier.jar
10120	In the Unisyn system verifier select the 'ovosoft.sig' file from the select signature file drop down menu.

	Hostname is the 192.168.0.4 of the OVO and the password is verifier password for the OVO. Connect. Verify All twice.
Criteria for Evaluation of the Test Results The results of this test will be accepted if the recorded checksum is the same as the derived checksum in the Unisyn system verifier. There should be no errors in the status column of the Unisyn system verifier. Any errors in the system verifier need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Software Server (SS) Telecommunication Testing of the OVO	
VVSG Requirements	V1-4.1.2.15, V1-6.2.2, V1-6.2.3, V1-6.2.5, V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the SS portion of the OVS. A software release will be transmitted using telecommunications technologies and verified that the software is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Software release 0.6.99 will be transmitted from the OCS to the OVO. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS, ES, and SS loaded OVO voting machine UNI000004 24-port Linksys Switch
Assumptions	The OVO machine is turned on after the SS has started. The TM is cleaned. The OCS machine is communicating with the OVO machine via the switch.
Step	Procedure
0	Record the release version of the software being used on the OCS.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the OCS laptop.
10020	Create new folder 'software' on the desktop.
10030	Insert the software release 0.6.99 CD into the OCS laptop. Copy Release.zip from the 0.6.99 CD to the new folder 'software'.
10040	Extract Release.zip into the 'software' folder. A Release.zip_FILES folder will be created. Open the Release.zip_FILES folder and copy the 'OVO' folder to the 'root's home' folder. Make sure there is an 'OC' and an 'OS' folder in the 'OVO' folder.
10050	Delete 'software' folder.
10060	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder.
10070	Open a terminal and run OVO_MD5_Check.sh script with the input being the extracted software folder from step 10040 . ./OVO_MD5_Check.sh /root/OVO > /root/Desktop/verifier/data/ovosoftware.sig This will create signature file 'ovosoftware.sig'
10080	Edit the sig file 'ovosoftware.sig'. Open the file and replace /root with , and click replace all.
10090	Launch SS from the root login on the OCS. cd /OCS/SoftwareServer java -ms50M -mx400M -jar SoftwareServer.jar Type the release key. Turn the OVO machine on and type in the validator password. The OVO machine will load the software from the OCS machine. Verify the release version is 0.6.99 Turn the OVO machine off.
10100	Launch ES from the root login on the OCS. cd /OCS/ElectionServer java -ms50M -mx400M -jar ElectionServer.jar Turn the OVO machine on. Make sure that the OVO and OCS are communicating.
10110	Open a terminal and start the Unisyn system verifier. cd /root/Desktop/verifier java -jar SystemVerifier.jar
10120	In the Unisyn system verifier select the 'ovosoftware.sig' file from the select signature file drop down

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Appendix A.5
Test Case Procedure Specification T56285-50

	menu. Hostname is the 192.168.0.4 of the OVO and the password is verifier password for the OVO. Connect. Verify All twice.
Criteria for Evaluation of the Test Results The results of this test will be accepted if the recorded checksum is the same as the derived checksum in the Unisyn system verifier. There should be no errors in the status column of the Unisyn system verifier. Any errors in the system verifier need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Software Server (SS) Telecommunication Testing of the OVI	
VVSG Requirements	V1-4.1.2.15,V1-6.2.2, V1-6.2.3, V1-6.2.5,V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the SS portion of the OVS. A software release will be transmitted using telecommunications technologies and verified that the software is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Software release 0.2.2 will be transmitted from the OCS to the OVI. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS, and SS loaded OVI voting machine UNI50003 24-port Linksys Switch
Assumptions	The OVI machine is turned on after the SS has started. The OCS machine is communicating with the OVI machine via the switch.
Step	Procedure
0	Record the release version of the software being used on the OCS.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the OCS laptop.
10020	Create new folder 'software' on the desktop.
10030	Insert the software release 0.2.2 CD into the OCS laptop. Copy Release.zip from the 0.2.2 CD to the new folder 'software'.
10040	Extract Release.zip into the 'software' folder. A Release.zip_FILES folder will be created. Open the Release.zip_FILES folder and copy the 'Unisyn' folder to the 'root's home' folder.
10050	Delete 'software' folder.
10060	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder.
10070	Open a terminal and run OVO_MD5_Check.sh script with the input being the extracted software folder from step 10040 . ./OVO_MD5_Check.sh /root/Unisyn > /root/Desktop/verifier/data/ovisoft.sig This will create signature file 'ovisoft.sig'
10080	Edit the sig file 'ovosoft.sig'. Open the file and replace /root with , and click replace all.
10090	Launch SS from the root login on the OCS. cd /OCS/SoftwareServer java -ms50M -mx400M -jar SoftwareServer.jar Type the release key. Turn the OVI machine on and type in the validator password. The OVI machine will load the software from the OCS machine. Verify the release version is 0.3.3
10100	Open a terminal and start the Unisyn system verifier. cd /root/Desktop/verifier java -jar SystemVerifier.jar
10110	In the Unisyn system verifier select the 'ovisoft.sig' file from the select signature file drop down menu. Hostname is the 192.168.150.3 of the OVI and the password is verifier password for the OVI. Connect. Verify All twice.
Criteria for Evaluation of the Test Results	
The results of this test will be accepted if the recorded checksum is the same as the derived checksum in the Unisyn system verifier. There should be no errors in the status column of the Unisyn system verifier. Any errors in the system verifier need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Software Server (SS) Telecommunication Testing of the OVI	
VVSG Requirements	V1-4.1.2.15,V1-6.2.2, V1-6.2.3, V1-6.2.5,V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the SS portion of the OVS. A software release will be transmitted using telecommunications technologies and verified that the software is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Software release 0.3.3 will be transmitted from the OCS to the OVI. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS, and SS loaded OVI voting machine UNI50003 24-port Linksys Switch
Assumptions	The OVI machine is turned on after the SS has started. The OCS machine is communicating with the OVI machine via the switch.
Step	Procedure
0	Record the release version of the software being used on the OCS.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the OCS laptop.
10020	Create new folder 'software' on the desktop.
10030	Insert the software release 0.3.3 CD into the OCS laptop. Copy Release.zip from the 0.3.3 CD to the new folder 'software'.
10040	Extract Release.zip into the 'software' folder. A Release.zip_FILES folder will be created. Open the Release.zip_FILES folder and copy the 'Unisyn' folder to the 'root's home' folder.
10050	Delete 'software' folder.
10060	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder.
10070	Open a terminal and run OVO_MD5_Check.sh script with the input being the extracted software folder from step 10040 . ./OVO_MD5_Check.sh /root/Unisyn > /root/Desktop/verifier/data/ovisoftware.sig This will create signature file 'ovisoftware.sig'
10080	Edit the sig file 'ovisoftware.sig'. Open the file and replace /root with , and click replace all.
10090	Launch SS from the root login on the OCS. cd /OCS/SoftwareServer java -ms50M -mx400M -jar SoftwareServer.jar Type the release key. Turn the OVI machine on and type in the supervisor password. The OVI machine will load the software from the OCS machine. Verify the release version is 0.3.3
10100	Open a terminal and start the Unisyn system verifier. cd /root/Desktop/verifier java -jar SystemVerifier.jar
10110	In the Unisyn system verifier select the 'ovisoftware.sig' file from the select signature file drop down menu. Hostname is the 192.168.150.3 of the OVI and the password is verifier password for the OVI. Connect. Verify All twice.
Criteria for Evaluation of the Test Results	
The results of this test will be accepted if the recorded checksum is the same as the derived checksum in the Unisyn system verifier. There should be no errors in the status column of the Unisyn system verifier. Any errors in the system verifier need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Tabulator and Tabulator Client Telecommunication Testing of the OVS	
VVSG Requirements	V1-2.1.9 Vote Count, V1-4.1.2.15, V1-6.2.2, V1-6.2.3, V1-6.2.5, V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the Tabulator and Tabulator Client portions of the OVS. Vote data will be transmitted using telecommunications technologies and verified that the data is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Vote data from the Volume & Stress test election will be transmitted from the Tabulator Client machine to the Tabulator (OCS) machine. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS and Tabulator loaded. Client machine with Tabulator Client loaded. TM from the Volume & Stress test election. 24-port Linksys Switch
Assumptions	For this test, network configuration settings must be changed between Tabulator (OCS) and Tabulator Client per Unisyn document 04-00428, Tabulator Client version 1.2 because two separate machines are being used for Tabulator and Tabulator Client.
Step	Procedure
0	Record the election version of the data being used on the Tabulator (OCS). Make sure the same election is being used on the Tabulator Client.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the Tabulator (OCS) laptop.
10020	Insert the Volume & Stress test election TM into the Tabulator (OCS) and copy the 'Data' folder from the TM to the 'root's home' folder of the Tabulator (OCS) machine.
10030	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder.
10040	Open a terminal and run OVO_MD5_Check.sh script with the input being the vote data files from step 10020 . ./OVO_MD5_Check.sh /root/Data/ > /root/Desktop/verifier/data/tabTM.sig This will create signature file 'tabTM.sig'
10050	Launch Tabulator from the root login on the OCS. cd /OCS/Tabulator/Monitor java -ms50M -mx400M -jar TabulatorMonitor.jar Login as superuser. Make sure that the Tabulator (OCS) and Tabulator Client are communicating.
10060	Start the Tabulator Client machine. Log in as administrator. Insert the Volume & Stress election CD. Launch the Tabulator Client. Log in as maintenance. Insert the TM when asked. Tabulator will extract the vote date files into the 'Voting' folder on the Tabulator machine.
10070	Open a terminal and run OVO_MD5_Check.sh script. ./OVO_MD5_Check.sh /Voting/TabulationService/Data/Election_<id>/Run<id>/Machine_<id> > /root/Desktop/verifier/data/tab.sig This will create signature file 'tab.sig'
10080	Open both the tabTM.sig and tab.sig files and compare the tally.xml line in each file. Check that the identifying number at the beginning of the tally.xml line is the same for both files.
Criteria for Evaluation of the Test Results	
The results of this test will be accepted if the checksum value in the tally.xml line for both the tabTM.sig and tab.sig files are the same. Any errors need to be logged and analyzed by Wyle qualified personnel.	

Test Case: Tabulator and OVCS Telecommunication Testing of the OVS	
VVSG Requirements	V1-2.1.9 Vote Count, V1-4.1.2.15, V1-6.2.2, V1-6.2.3, V1-6.2.5, V1-6.2.7
Test Objective:	Test Configuration:
The test verifies the telecommunications capabilities of the Unisyn OpenElect Voting System (OVS). This will test the Tabulator and OpenElect Voting Cnetral Scan (OVCS) of the OVS. Vote data will be transmitted using telecommunications technologies and verified that the data is accurate and unchanged during the transmission.	Laptop with OCS and root login capabilities. Vote data from the Volume & Stress test election will be transmitted from the OVCS machine to the Tabulator (OCS) machine. A Unisyn verification tool and MD5 checksum utility will be used to verify accurate transmission.
Devices Utilized:	Laptop with OCS and Tabulator loaded. Client machine with OVCS loaded. TM 24-port Linksys Switch
Assumptions	For this test, network configuration settings must be changed between Tabulator (OCS) and OVCS per Unisyn document 04-00428, Tabulator Client version 1.2 because two separate machines are being used for Tabulator and OVCS. The ballots from the Volume & Stress Election have been scanned through the OVCS. A session name file will created after the scan is complete.
Step	Procedure
0	Record the election version of the data being used on the Tabulator (OCS). Make sure the same election is being used on the OVCS.
10000	Record date and time of the test start. Record test operator.
10010	Login as root on the Tabulator (OCS) laptop.
10020	Login as administrator on the OVCS machine. Copy the 'Data' folder onto a TM from the following directory: Filesystem\OVCSData\Election<id>\session<name>
10030	Copy the 'Data' folder from the TM to the 'root's home' folder of the OCS.
10040	Create a new folder on the desktop 'verifier' Copy the Unisyn verification tool into a new folder 'verifier'. Copy the OVO_MD5_Check.sh script into the 'root's home' folder.
10050	Open a terminal and run OVO_MD5_Check.sh script with the input being the vote data files from step 10030 . ./OVO_MD5_Check.sh /root/Data/ > /root/Desktop/verifier/data/ovcsTM.sig This will create signature file 'ovcsTM.sig'
10060	Launch Tabulator from the root login on the OCS. cd /OCS/Tabulator/Monitor java -ms50M -mx400M -jar TabulatorMonitor.jar Login as superuser. Make sure that the Tabulator (OCS) and OVCS are communicating.
10070	Start the OVCS machine. Log in as administrator. Insert the Volume & Stress election CD. Launch the OVCS. Log in as maintenance. Select the session name file and upload to the Tabulator. The vote files will be uploaded and stored in 'Voting' folder on the Tabulator machine.
10080	Open a terminal and run OVO_MD5_Check.sh script. ./OVO_MD5_Check.sh /Voting/TabulationService/Data/Election_<id>/Run<id>/Machine_<id> > /root/Desktop/verifier/data/ovcs.sig This will create signature file 'ovcs.sig'
10090	Open both the ovcsTM.sig and ovcs.sig files and compare the tally.xml line in each file. Check that the identifying number at the beginning of the tally.xml line is the same for both files.
Criteria for Evaluation of the Test Results	
The results of this test will be accepted if the checksum value in the tally.xml line for both the ovcsTM.sig and ovcs.sig files are the same. Any errors need to be logged and analyzed by Wyle qualified personnel.	

ATTACHMENT B
2005 VVSG REQUIREMENTS CHECKLIST

“X” Requirements were met

VVSG Req. No.	2005 VVSG Volume I Functional Requirement Matrix	REQUIREMENTS MET
Volume I	Voting System Performance Guidelines	
Section 2	Functional Requirements	
2.1	Overall System Capabilities	
2.1.9	Telecommunications	
	<p>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 guidelines. Section 6 describes telecommunications standards that apply to, at a minimum, the following types of data transmission:</p> <p>Voter Authentication: Coded information that confirms the identity of a voter for security purposed for a system that transmit votes individually over a public network.</p> <p>Ballot Definition: Information that describes to voting equipment the content and appearance of the ballots to be used in an election.</p> <p>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.</p> <p>Vote Count: Information representing the tabulation of votes at any one of several levels: polling place, precinct, or central count.</p> <p>List of Voters: A listing of the individual voters who have cast ballots in a specific election.</p>	X
Section 4	Hardware	
4.1	Performance Requirements	
4.1.2	Environmental Requirements	
4.1.2.15	Data Networking 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 6 and the Security requirements described in Section 7.	X
Section 6	Telecommunications	
6.2	Design, Construction, and Maintenance Requirements	
6.2.1	Accuracy	
	Telecommunications components of all voting systems shall meet the accuracy requirements of Subsection 4.1.1.	X
6.2.2	Durability	
	Telecommunications components of all voting systems shall meet the durability requirements of Subsection 4.3.2.	X

VVSG Req. No.	2005 VVSG Volume I Functional Requirement Matrix	REQUIREMENTS MET
Volume I	Voting System Performance Guidelines	
6.2.3	Reliability	
	Telecommunications components of all voting systems shall meet the reliability requirements of section 4.3.3.	X
6.2.4	Maintainability	
	Telecommunications components of all voting systems shall meet the maintainability requirements of section 4.3.4.	X
6.2.5	Availability	
	Telecommunications components of all voting systems shall meet the availability requirements of section 4.3.5.	X
6.2.7	Confirmation	
	The telecommunications components of a voting system shall notify the user of the successful or unsuccessful completion of the data transmission.	X
	In the event of unsuccessful transmission the user shall be notified of the action to be taken.	X
7	Security Requirements	
7.5	Telecommunications and Data Transmission	
7.5.1	Maintaining Data Integrity	
	Voting Systems that use telecommunication 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.	
a	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.	X
b	Voting systems that use telecommunications to communicate between system components and locations before the polling place is officially closed shall: <ul style="list-style-type: none"> i. Implement an encryption standard currently documented and validated for use by an agency of the U.S. government ii. Provide a means to detect the presence of an intrusive process, such as an Intrusion Detection System. 	X