



ALEX PADILLA | SECRETARY OF STATE | STATE OF CALIFORNIA
OFFICE OF VOTING SYSTEMS TECHNOLOGY ASSESSMENT
1500 11th Street | Sacramento, CA 95814 | **Tel** 916.695.1680 | **Fax** 916.653.4620 | www.sos.ca.gov

Dominion ImageCast Remote Version 5.10

Remote Accessible Vote by Mail System

Staff Report

**Prepared by:
Secretary of State's Office of
Voting Systems Technology Assessment**

November 25, 2019

Table of Contents

I.	Introduction	1
	1. Scope.....	1
	2. Summary of the Application.....	1
	3. Contracting and Outsourcing	1
II.	Summary of the System	2
III.	Testing Information and Results	2
	1. Background.....	2
	2. Functional Testing Summary	2
	3. Software Review Testing Summary	3
	4. Security and Telecommunications Testing Summary	4
	5. Usability, Accessibility & Privacy Testing Summary	5
IV.	Compliance with State and Federal Laws and Regulations.....	6
	1. Elections Code Review	6
	2. Section 508 and WCAG Review	7
V.	Conclusion	7

I. INTRODUCTION

1. Scope

This staff report presents the test results for all phases of the certification test of Dominion Voting Systems ImageCast Remote 5.10 Remote Accessible Vote by Mail (RAVBM) system. The purpose of the testing is to test the compliance of the remote accessible vote by mail system with California and federal laws. Testing also uncovers other findings, which do not constitute non-compliance, and those findings are reported to the remote accessible vote by mail system vendor to address the issues procedurally. The procedures for mitigating any additional findings are made to the documentation, specifically the ImageCast Remote 5.10 Use Procedures. ImageCast Remote 5.10 was evaluated against the applicable portions of the California Voting Systems Standards (CVSS). The CVSS were written in such a way to be applicable to a wide variety of voting technology, therefore the relevant portions of the CVSS were reviewed as it relates to the ImageCast Remote 5.10 RAVBM system for purposes of this report. The use of “voting system” shall apply to RAVBM.

2. Summary of the Application

Dominion Voting Systems Inc. submitted an application for the ImageCast Remote 5.10 remote accessible vote by mail system on October 24, 2018. ImageCast Remote 5.10 is a vendor hosted application, solely for the purposes of ballot marking pursuant to Elections Code sections 303.3 and 19283.

Dominion was required to submit the following: 1) the technical documentation package (TDP); 2) two test environments; 3) source code; and 4) the Dominion ImageCast Remote 5.10 Use Procedures.

3. Contracting and Consulting

Upon receipt of a complete application, the Secretary of State released a Request for Quote (RFQ) for assistance with the Security and Telecommunications, Usability, Accessibility and Privacy, and a Software Test (Source Code Review).

Through the formal California contracting process and pursuant to California Elections Code section 19285, the Secretary of State awarded a contract to SLI Compliance, a division of Gaming Laboratories International, LLC, to serve in the capacity as the state-approved testing agency or expert technician to examine the remote accessible vote by mail system.

II. SUMMARY OF THE SYSTEM

ImageCast Remote 5.10 remote accessible vote by mail system is a web-based interface. The voter can optionally use a screen reader to navigate the ballot. After marking their ballots and reviewing their selections, the voter must print their selections. The printed paper cast record is returned to the local elections official, where it will be remade into a ballot for tabulation. The printed paper cast record and the ballot are kept together for auditing purposes.

III. TESTING INFORMATION AND RESULTS

1. Background

The ImageCast Remote 5.10 remote accessible vote by mail system application is a fully hosted service provided by Dominion. The application platform used in the ImageCast Remote 5.10 platform is based on Windows Server 2012 R2 and the development environment is Visual Studio 2015. Users can access the application platform using industry standard web browsers.

Functional Accessibility testing of this system was conducted by SOS Staff. The testing took place in June, July and October of 2019. Approximately 29 volunteers throughout the state of California participated. Testers were given the option to take a pre-test survey, of which 14 of the testers responded. The survey results can be found in Attachment A. Additionally, testers provided general written feedback to the SOS about their experience.

The Software, Security and Telecommunications, and Usability, Accessibility, and Privacy testing was performed by SLI in a mirroring test environment.

2. Functional Testing Summary

System Configuration:

The ImageCast Remote 5.10 remote accessible vote by mail system is supported by a fully redundant network and application architecture protecting against a single point of failure.

For the functional test, the SOS had two test elections configured based on California elections as described below:

1. State of California General Election
2. Local Jurisdiction – Fictional Rank Choice Election

Each election performed as expected, however the instructions for the Rank Choice Election were consistently noted to be confusing.

Undervotes

The system warned of undervotes, and allowed the tester to proceed to the end of the ballot to print the paper cast record.

Overvotes

The system warned of overvotes, and allowed the tester to proceed to the end of the ballot and print the paper cast record.

Write-Ins

The system allowed the tester to make write in selections with a fifty (50) character limit.

Printed Paper Cast Record

Each paper cast record printed displays the Election Name, Election Type (General/Primary) and the date of the Election within the header. The appropriate Ballot Style is listed, in addition to one or more QR code, and the voter's precinct is also listed. Each contest along with the voter's selections in a human readable format, are printed on the paper cast record. The QR code contains the voter's selections, however it cannot be used for tabulation or read using QR code readers from application stores. The QR code is encrypted, and can only be decrypted by an election official, using a decoder built into the adjudication system. The election official can verify the selections correspond to those listed on the paper cast record, and either hand duplicate or utilize the adjudication system to duplicate the paper cast record onto a traditional ballot for tabulation. The paper cast record is kept with the duplicated ballot for auditing purposes.

3. Software Review Testing Summary

SLI performed Software Testing (Source Code Review) of the ImageCast Remote 5.10 RAVBM system. SLI utilized the following tools:

- Module Finder: an SLI proprietary application used to parse module names from C/C++ and VB code and populate the identified module names into the review documents.
- StyleCop: a commercial application used to review code to stated requirements.
- Understand: a commercial application used to review code to stated requirements.

SLI found no discrepancy findings or vulnerabilities, within the ImageCast Remote 5.10 RAVBM system. See the testing consultant's Source Code Test Report located on the Secretary of State website for more information.

4. Security and Telecommunications Testing

SLI performed Security and Telecommunications Testing on the ImageCast 5.10 Remote System over three Phases. The first phase was a comprehensive documentation review for compliance with the applicable portions of the CVSS. The second phase consisted of Functional Security Testing, followed by a third phase of Telecommunications and Data Transmission Testing. The issues identified during Security and Telecommunications testing are listed below, along with mitigations by the vendor.

Table 4A: Security and Telecommunications	
Issue Identified	Vendor Mitigation
CVSS Section 7.4.5 – The documentation doesn't describe a process used to verify the software distributed is the software provided by the NSRL or designated repository. The documentation doesn't provide a procedure or functionality to verify that the software is the certified software by comparison.	Dominion provided high-level documentation about the process and procedure to verify the software version.
CVSS Section 7.4.6 – The documentation doesn't reference any type of digital verification on software prior to installation. No documentation on the method provided by external interface or equipment used to verify software on the system. No documentation about a mechanism for detecting unauthorized software.	Dominion provided high-level documentation about the process and procedure to verify the software version.
CVSS Section 7.2.1 – General Access Control – On the administrative application it was found that the password field has autocomplete enabled.	This is the behavior in Firefox (since version 38), Google Chrome (since 34), and Internet Explorer (since version 11). The vendor has no control over this functionality.
Server-Side JavaScript Code Injection	The value posted in the ddlValidStatus parameter is not dynamically evaluated on the server side. The System compares the submitted value with all available pre-defined values on the server side. If such situation occurs, the default value will still be displayed in the drop-down.
Cross-Site Scripting (Reflected)	This issue can manifest itself only on the DevLogViewer.aspx (Developer Log) page on the administrative site where the system displays errors, amongst other information, which is usually of little meaning to election administration users. In this case system logs Error Message: A potentially dangerous Request.QueryString value

Table 4A: Security and Telecommunications	
	was detected from the client, but also logs the entire error message which is rendered on the client as html. Thus, this cannot affect regular election operations.

See the testing consultant’s Security and Telecommunications Report located on the Secretary of State website for more information.

5. Usability, Accessibility and Privacy Testing Summary

SLI performed Security and Telecommunications Testing on the ImageCast 5.10 Remote System over three Phases. The first phase was a comprehensive documentation review for compliance with the applicable portions of the CVSS. The second phase consisted of Usability and Accessibility Testing, followed by a third phase of Privacy Testing. The issues identified during Usability, Accessibility and Privacy testing are listed below, along with mitigations by the vendor.

Table 5A Usability, Accessibility and Privacy Testing	
Issue Identified	Vendor Mitigation
CVSS Section 3.2.6 - Perceptual Issues - One anomaly was found with the Administrative portion of the application. The white or grey text on red background does not meet the WCAG contrast ratio.	No voter will be accessing the administrative portion of ImageCast Remote 5.10.
CVSS Section 3.2.7c.ii- No Repeating Keys - Review of the requirement showed that navigation keys (up and down arrows, tab) did have a repetitive effect.	The vendor couldn’t reproduce the issue on supported browsers inside the voter portion of the ImageCast Remote 5.10 application.
CVSS Section 3.2.8.e - Review of the ImageCast Remote 5.10 showed that after five minutes, no inactivity warning was issued.	All sessions timeouts are handled by the server, because of the nature of the ImageCast Remote 5.10 application (being disconnected from the server), the ImageCast Remote 5.10 user interface doesn't invalidate the session. By the same token, voters can enter the application unlimited times, rules and regulations in California for the ImageCast Remote 5.10 application have safeguards in place to prevent multiple ballots by the same voter from being accepted in the election office.
CVSS Section 3.2.8.f - Review of the ImageCast Remote 5.10 showed that	All sessions timeouts are handled by the server, because of the nature of the ImageCast Remote 5.10

Table 5A Usability, Accessibility and Privacy Testing	
after five minutes, no alert was issued, nor did the system convert to an inactive state.	application (being disconnected from the server), the ImageCast Remote 5.10 user interface doesn't invalidate the session. By the same token, voters can enter the application unlimited times, rules and regulations in California for the ImageCast Remote 5.10 application have safeguards in place to prevent multiple ballots by the same voter from being accepted in the election office.

See the testing consultant’s Usability, Accessibility, and Privacy Report located on the Secretary of State website for more information.

IV. COMPLIANCE WITH STATE AND FEDERAL LAWS AND REGULATIONS

1. Elections Code Review

1) §19283 (b) Remote accessible vote by mail system standards adopted by the Secretary of State pursuant to subdivision (a) shall include, but not be limited to, all of the following requirements:

- (1) The machine or device and its software shall be suitable for the purpose for which it is intended.
- (2) The remote accessible vote by mail system shall preserve the secrecy of the ballot.
- (3) The remote accessible vote by mail system shall be safe from fraud or manipulation.
- (4) The remote accessible vote by mail system shall be accessible to voters with disabilities and to voters who require assistance in a language other than English if the language is one in which a ballot or ballot materials are required to be made available to voters.

The system meets these requirements. The system demonstrated English, Spanish and Chinese languages, however with external translation services; the system can support other languages as required.

2) §19295 A remote accessible vote by mail system or part of a remote accessible vote by mail system shall do not any of the following:

- (a) Have the capability, including an optional capability, to use a remote

server to mark a voter's selections transmitted to the server from the voter's computer via the Internet.

(b) Have the capability, including an optional capability, to store any voter identifiable selections on any remote server.

(c) Have the capability, including the optional capability, to tabulate votes.

The system meets these requirements.

2. Section 508 and WCAG Compliance Review

ImageCast Remote 5.10 was written to WCAG 2.0 guidelines to implement accessibility features. The system also complies with the applicable portions of Section 508.

V. CONCLUSION

The ImageCast Remote 5.10 remote accessible vote by mail system, in the configuration tested and documented by the Dominion Voting Systems Inc.'s ImageCast Remote 5.10 Use Procedures, meets all applicable California and federal laws. The ImageCast Remote 5.10 remote accessible vote by mail system is compliant with all California and federal laws.

Q1 Name

Answered: 14 Skipped: 0

#	RESPONSES	DATE
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████

Q2 Age

Answered: 14 Skipped: 0

#	RESPONSES	DATE
1	30	6/23/2019 10:25 PM
2	30	6/22/2019 12:04 AM
3	49	6/21/2019 10:16 PM
4	66	6/21/2019 9:34 PM
5	73	6/21/2019 6:23 PM
6	30	6/21/2019 2:57 AM
7	71	6/20/2019 6:25 AM
8	52	6/19/2019 3:59 AM
9	60	6/19/2019 1:28 AM
10	53	6/19/2019 12:58 AM
11	38	6/18/2019 10:13 PM
12	66	6/18/2019 6:35 PM
13	48	6/18/2019 6:12 PM
14	57	6/18/2019 3:34 PM

Q3 Phone

Answered: 14 Skipped: 0

#	RESPONSES	DATE
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████

█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████

Q4 Email

Answered: 14 Skipped: 0

#	RESPONSES	DATE
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████
█	██████████	██████████

Q5 Please describe the disabilities or difficulties you have that may interfere with you being able to mark a ballot privately and independently.

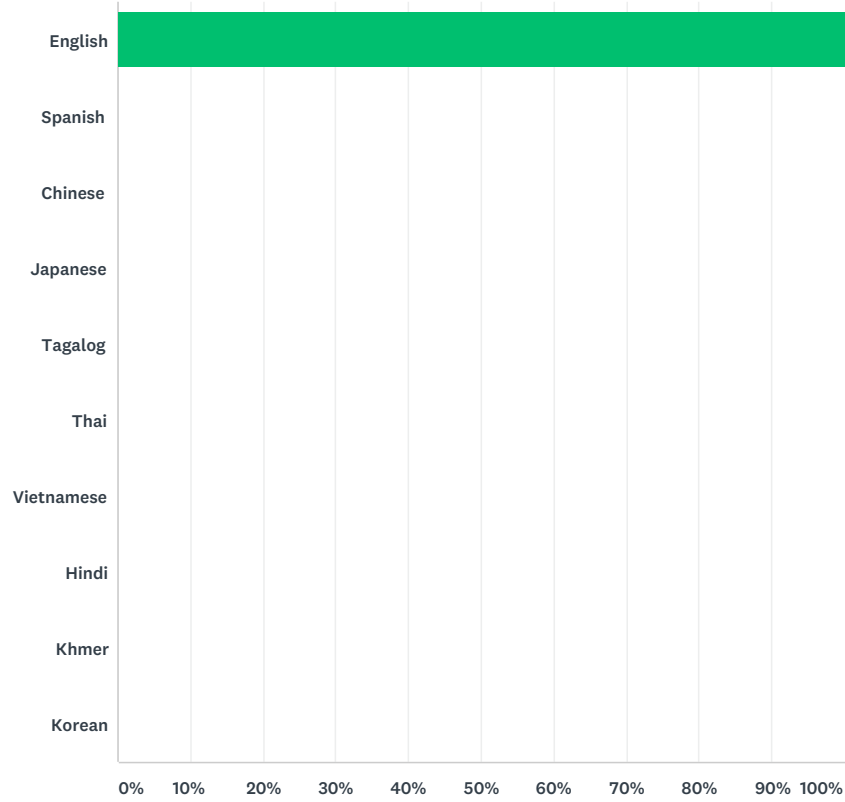
Answered: 12 Skipped: 2

#	RESPONSES	DATE
1	visual impairment	6/23/2019 10:27 PM
2	I am blind.	6/22/2019 12:07 AM
3	Unable to read regular print due to total blindness	6/21/2019 10:35 PM
4	Totally blind	6/21/2019 9:35 PM
5	legally blind	6/21/2019 6:26 PM
6	Low vision, blindness	6/21/2019 3:00 AM
7	I am blind.	6/20/2019 6:26 AM
8	Disabling AIDS which can limit my mobility and abilities to vote.	6/19/2019 4:00 AM
9	I am totally blind, therefor I cannot read any of the different fforms of ballots	6/19/2019 1:31 AM
10	I am totally blind	6/18/2019 10:14 PM

11	visual impairment	6/18/2019 6:37 PM
12	Mobility and dexterity impairments	6/18/2019 6:15 PM

Q6 Which language would you prefer voting in ?

Answered: 12 Skipped: 2

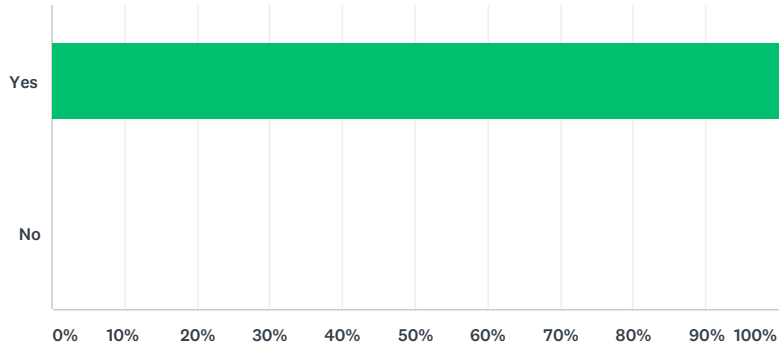


ANSWER CHOICES	RESPONSES	
English	100.00%	12
Spanish	0.00%	0
Chinese	0.00%	0
Japanese	0.00%	0
Tagalog	0.00%	0
Thai	0.00%	0
Vietnamese	0.00%	0
Hindi	0.00%	0
Khmer	0.00%	0
Korean	0.00%	0
TOTAL		12

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q7 Have you ever voted before?

Answered: 13 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	100.00%	13
No	0.00%	0
TOTAL		13

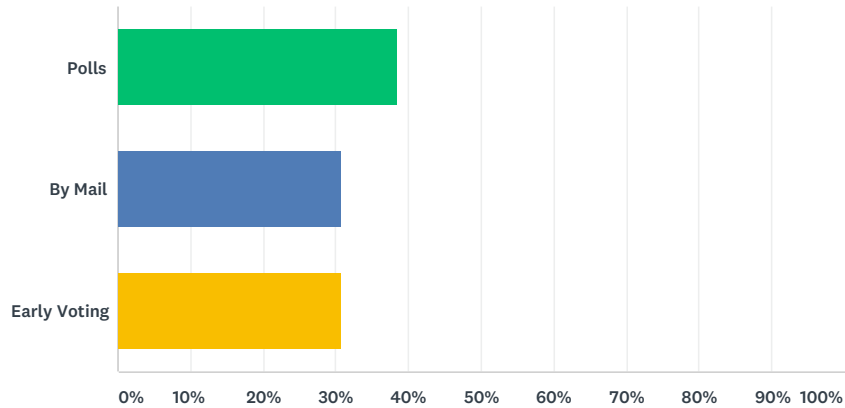
Q8 If "No", what has prevented you from voting in the past?

Answered: 2 Skipped: 12

#	RESPONSES	DATE
1	Exactly what happened during last presidential election (my first and only vote): My helper marked the person I said should not be chosen because that was his candidate. I knew because the ballot was returned to me for no signature.	6/21/2019 10:35 PM
2	Sometimes I do not vote because I am unable to vote on my own.	6/19/2019 1:01 AM

Q9 What method of voting do you use most often?

Answered: 13 Skipped: 1

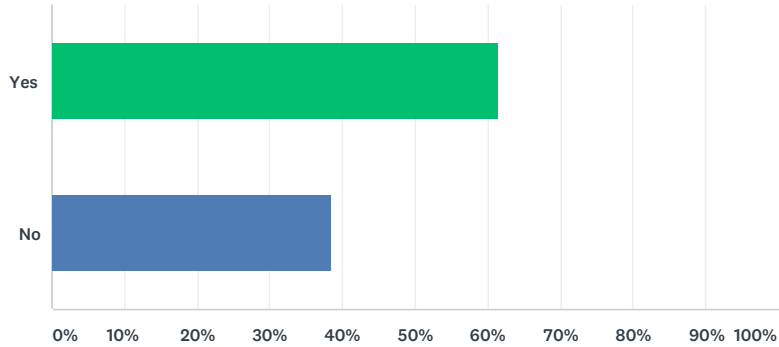


ANSWER CHOICES	RESPONSES	
Polls	38.46%	5
By Mail	30.77%	4
Early Voting	30.77%	4
TOTAL		13

#	OTHER (PLEASE SPECIFY)	DATE
1	Online electronic	6/21/2019 3:00 AM
2	talking voting machine	6/19/2019 1:31 AM

Q10 Have you ever used a voting system with any special accessibility accommodations?

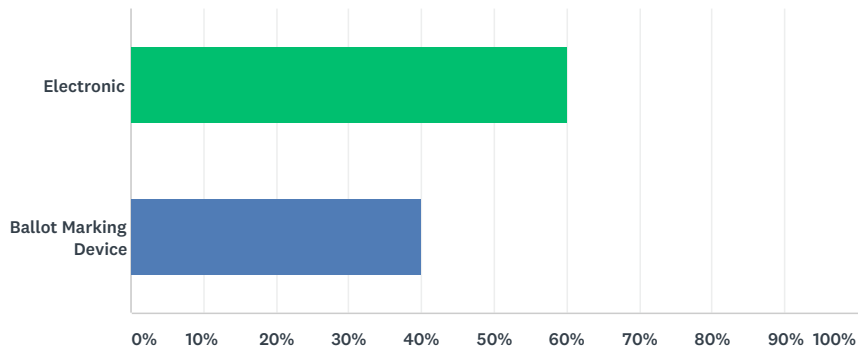
Answered: 13 Skipped: 1



ANSWER CHOICES	RESPONSES	
Yes	61.54%	8
No	38.46%	5
TOTAL		13

Q11 If "Yes", which type of voting system?

Answered: 10 Skipped: 4



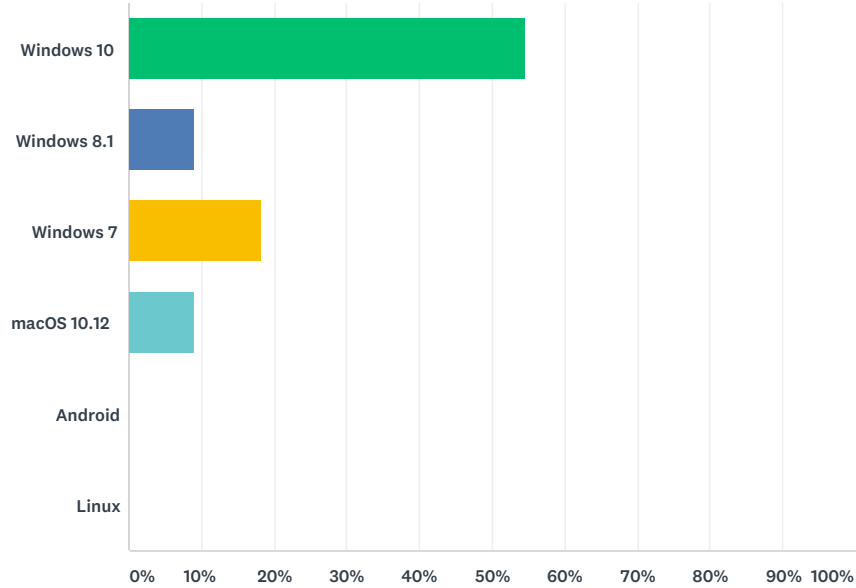
ANSWER CHOICES	RESPONSES	
Electronic	60.00%	6
Ballot Marking Device	40.00%	4
TOTAL		10

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q12 What operating system are you using?

Answered: 11 Skipped: 3

Dominion ImageCast Remote 5.10 Remote Accessible Vote by Mail Pre-Test Survey Wave I

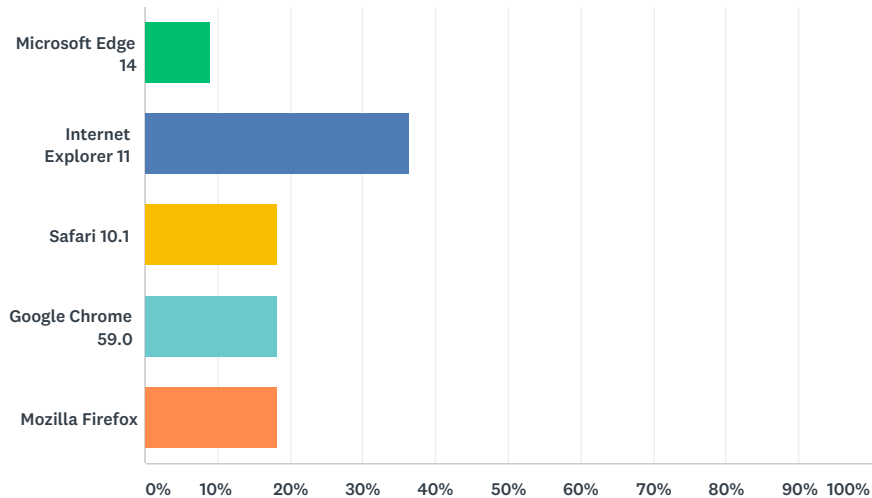


ANSWER CHOICES	RESPONSES
Windows 10	54.55% 6
Windows 8.1	9.09% 1
Windows 7	18.18% 2
macOS 10.12	9.09% 1
Android	0.00% 0
Linux	0.00% 0
TOTAL	11

#	OTHER (PLEASE SPECIFY)	DATE
1	IOS12	6/22/2019 12:15 AM
2	ios 12.3	6/21/2019 6:41 PM
3	I am not sure but my system is brand new	6/19/2019 1:05 AM

Q13 What internet browser are you using?

Answered: 11 Skipped: 3



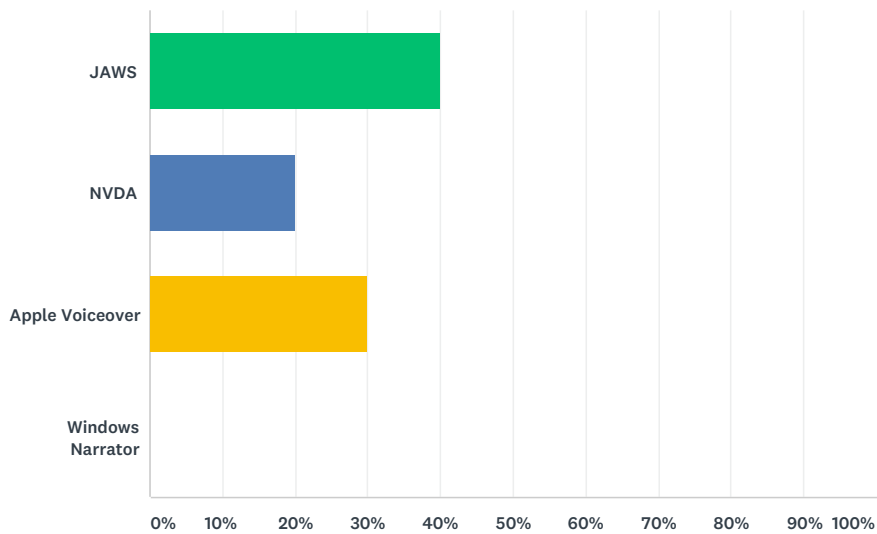
Dominion ImageCast Remote 5.10 Remote Accessible Vote by Mail Pre-Test Survey Wave I

ANSWER CHOICES	RESPONSES
Microsoft Edge 14	9.09% 1
Internet Explorer 11	36.36% 4
Safari 10.1	18.18% 2
Google Chrome 59.0	18.18% 2
Mozilla Firefox	18.18% 2
TOTAL	11

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q14 List the auxiliary devices and/or software you are using for electronic accessibility.

Answered: 10 Skipped: 4



ANSWER CHOICES	RESPONSES
JAWS	40.00% 4
NVDA	20.00% 2
Apple Voiceover	30.00% 3
Windows Narrator	0.00% 0
TOTAL	10

#	OTHER (PLEASE SPECIFY)	DATE
1	Windows accessibility settings	6/18/2019 6:21 PM

Q15 What is the make and model of the hardware you are using (PC, Laptop, Tablet, etc.)?

Answered: 11 Skipped: 3

#	RESPONSES	DATE
1	iPhone7	6/22/2019 12:15 AM
2	Dell laptop	6/21/2019 10:40 PM

Dominion ImageCast Remote 5.10 Remote Accessible Vote by Mail Pre-Test Survey Wave I

3	Dell Laptop	6/21/2019 9:37 PM
4	Iphone 6	6/21/2019 6:41 PM
5	Dell Computer	6/20/2019 6:28 AM
6	ASUS all in one	6/19/2019 4:02 AM
7	Desktop PC Processor: Intel(R) Core(TM) i7 CPU 860 @ 2.80GHz 2.79 GHz Installed memory (RAM): 8.00 GB System type: 64-bit Operating System Pen and Touch: No Pen or Touch Input is available for this Display	6/19/2019 1:43 AM
8	PC	6/19/2019 1:05 AM
9	TC	6/18/2019 10:17 PM
10	Dell	6/18/2019 6:40 PM
11	Dell OptiPlex 3060	6/18/2019 6:21 PM

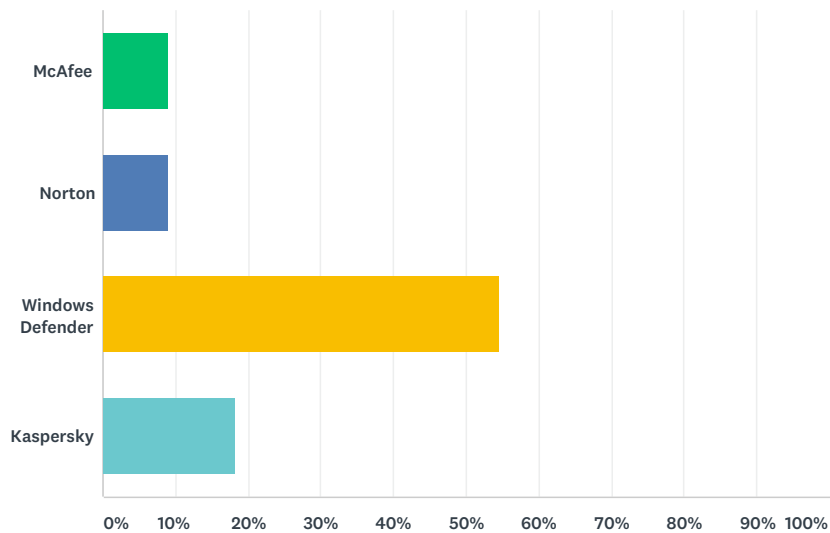
Q16 What is the printer make and model you are using?

Answered: 10 Skipped: 4

#	RESPONSES	DATE
1	HP ENVY 5530	6/22/2019 12:15 AM
2	HP Laser Jet 1100	6/21/2019 10:40 PM
3	HP	6/21/2019 9:37 PM
4	H 8750	6/21/2019 6:41 PM
5	Brother Printer	6/20/2019 6:28 AM
6	hp	6/19/2019 4:02 AM
7	HP LaserJet P2055d UPD PCL 6 on network	6/19/2019 1:43 AM
8	Epson Workforce WF2750	6/19/2019 1:05 AM
9	Kyocera	6/18/2019 10:17 PM
10	HP 3010 series	6/18/2019 6:21 PM

Q17 What antivirus software are you using?

Answered: 11 Skipped: 3



ANSWER CHOICES	RESPONSES
McAfee	9.09% 1
Norton	9.09% 1

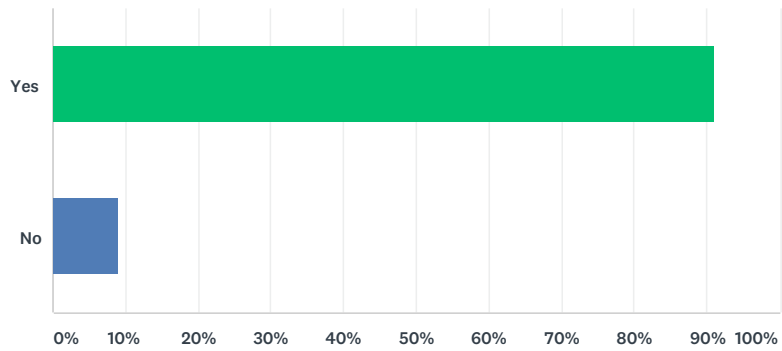
Dominion ImageCast Remote 5.10 Remote Accessible Vote by Mail Pre-Test Survey Wave I

Windows Defender	54.55%	6
Kaspersky	18.18%	2
TOTAL		11

#	OTHER (PLEASE SPECIFY)	DATE
1	None	6/22/2019 12:15 AM
2	AVG free and windos defender	6/19/2019 1:43 AM
3	not sure	6/19/2019 1:05 AM
4	MalWarebytes	6/18/2019 10:17 PM
5	Nod32	6/18/2019 6:40 PM

Q18 Is your antivirus software up to date?

Answered: 11 Skipped: 3



ANSWER CHOICES	RESPONSES	
Yes	90.91%	10
No	9.09%	1
TOTAL		11