Report:

Testing for Dominion ImageCast Evolution (ICE) Version 4.14.30 and ImageCast Precinct (ICP) Version 4.9.13
FINAL

Prepared for:

NEW YORK STATE | Board of Elections

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1 INTRODUCTION

At the request of the New York State Board of Elections (SBOE), the New York State Technology Enterprise Corporation (NYSTEC) conducted functional testing of the Dominion ImageCast Evolution (ICE) version(v) 4.14.30 and the ImageCast Precinct v4.9.13 upgrades. In this effort, the scope of NYSTEC's assessment included the following:

- Worked collaboratively with SBOE in the development of tests to assess the function, documentation and security commensurate to the proposed vendor changes which include:
  1) **ICE v4.14.30**
     a) Printer replacement to current model Addmaster KR-85A printer module (See section 7.1.1, below) with the new firmware
     b) New memory card export ability available through Tech Menu for unit software verification by checking hash value (See section 7.1.2, below)
  2) **ICP v4.9.13**
     a) Improvement to ballot processing to decrease the amount of ballot ID misreads (See section 7.1.1, below)
- Conducted functional tests and recorded results. (See section 7, below)
- Reviewed Dominion ICE and ICP upgrade documentation including TDP updates (See Appendix B – Documentation Reviewed for ICE and ICP UpgradeB).
- Reviewed the security implications and the changes' adherence to NYS Laws and Regulations.

2 EXECUTIVE SUMMARY

Dominion Voting Systems submitted to SBOE on December 27, 2019, a request for modification of the certified ICE v4.14.27 and ICP v4.9.13. For the ICE, it was cited that the KR-85 printer was no longer commercially available and was being replaced by the updated KR-85A printer module. Also included in the modification request was a new export function via the Tech Menu allowing the CF0 memory card contents to be copied to the CF1 memory card device for unit software verification. These new changes were proposed to be incorporated in v4.14.30 and PCOS-410A. For the ICP, Dominion cited improvements to the ballot processing of the ballots IDs to decrease the amount of ballot misreads which would be incorporated in the proposed v4.9.13.

After reviewing the proposed changes, SBOE considered them to be low risk and continued with security, software, and functional testing, to potentially certify the proposed changes to the ICE and ICP. Accredited Voting System Test Laboratory (VSTL) Pro V&V conducted the primary source code review, and Accredited Voting System Test Laboratory (VSTL) SLI conducted the secondary source code review and performed the Trusted Builds.

Through NYSTEC's various functional tests which included such things as simulated voter testing, both in regular and accessible sessions and test deck run through and physical examination, the following outcomes and recommendations have been determined:

ICE v4.14.30

1. Based on observations made through functional testing, the new KR-85A printer module and the new firmware functions without issue and can seamlessly fit into the same physical space as the prior model. Informed by functional test results, NYSTEC recommends the certification of the KR-85A printer module.
2. NYSTEC successfully followed the Dominion provided export instructions confirming that the new export feature from the ICE allows for voting system software verification by exporting CF0 card to the CF1 card. Additionally, NYSTEC ran a hash check on CF1 validating that the SLI Trusted Build was installed. NYSTEC recommends including instruction if the export fails and for the user to contact SBOE Voting Operations for assistance. However, NYSTEC believes the firmware extract function violates VVSG 7.4.6.b.i (See section 6.1 below, for details). As such, NYSTEC recommends this new export feature **not** be used for pre-qualification testing, but rather, the counties should continue to use the current hash check procedures.

ICP v4.9.13

1. NYSTEC did not experience any misreads of ballot IDs in testing different ballot styles or sizes. All test decks adjudicated without error. Although no baseline accuracy metric was available prior to testing, no ballot ID reading errors were identified or experienced. Based on functional testing results, NYSTEC recommends that the change to v4.9.13 be accepted and that future performance improvements establish baseline metrics, so the tester has a point of reference to validate vendor claims.

3 PRECONDITIONS IN DOMINION ICE FUNCTIONAL TESTING

The NYSTEC scope of review was predicated on the following preconditions accepted by the SBOE for the Dominion ICE 4.14.30 upgrade.

1) **Dominion ICE 4.14.30 upgrade** – Because this is considered an upgrade to the existing certified device (current certified software version 4.14.27), testing focused on changes included and documented in the upgrade, from the 4.14.27 baseline.

   a) SLI Compliance performed the Trusted Build, which was delivered to SBOE on January 24th, 2020 and installed by SBOE staff on the certified ICE voting system test unit prior to NYSTEC functional testing. This was the device used for all tests.

2) **Source Code Review** – It was accepted by the SBOE that source code review results were in compliance with 2005 VVSG Version 1 , based on:

   a) Pro V&V – Primary Source Code Review, dated 1/2/2020.
   b) SLI – Secondary Source Code Review (See # 3 below) and generated Trusted Build.

3) **NYS Election Law and Regulations** – It was accepted by the SBOE that relevant requirements from NYS Election Law and 6209 and 6210 regulations were completed by SLI. See "Appendix A: Security Requirements Verified by SLI" for list of requirements and see the following report for more information:

   a) NYSBOE DVS (ICE) 4.14.30 Source Code Review Report v1.0.pdf, dated February 13, 2020

4) **TDP Review** – It was accepted by the SBOE that the Technical Data Package (TDP) review completed under Dominion Suite 4.14.E federal certification by Pro V&V confirmed completeness with 2005 VVSG Version 1 requirements.

5) **Election Management Testing (EMS)** – The SBOE Election Operations Unit used NYS Certified EMS suite 4.9.17 (12/10/2012) in the current upgrade testing of the ICE to:

   a) Prepare iButtons.
   b) Generate election configuration files.
   c) Write ('burn') compact flash (CF) Cards (Primary and Backup).
   d) Generate results using Results Tally and Reporting (RTR) (printing of reports, logs, etc.).

4 PRECONDITIONS IN THE DOMINION ICP FUNCTIONAL TESTING

The NYSTEC scope of review was predicated on the following preconditions accepted by the SBOE for the Dominion ICP 4.9.13 upgrade.

1) **Dominion ICP 4.9.13 upgrade** – Because this is considered an upgrade to the existing certified device (current certified software version 4.9.12), testing focused on changes included and documented in the upgrade, from the 4.9.12 baseline.

a) SLI Compliance performed the Trusted Build, which was delivered to SBOE on January 24th, 2020 and installed by SBOE staff on the certified ICP voting system test unit prior to NYSTEC functional testing. This was the device used for all tests.

2) **Source Code Review** – It was accepted by the SBOE that source code review results were in compliance with 2005 VVSG Version 1 , based on:

   a) Pro V&V – Primary Source Code Review, based on the letter from Wendy Owens of Pro V&V, dated 1/2/2020.
   b) SLI – Secondary Source Code Review (See #3 below) and generated Trusted Build.

3) **NYS Election Law and Regulations** – It was accepted by the SBOE that relevant requirements from NYS Election Law and 6209 and 6210 regulations were completed by SLI. See "Appendix A: Security Requirements Verified by SLI" for list of requirements and see the following file for more information:

   a) NYS BOE DVS (ICP) 4.9.13 Source Code Review Report v1.0.pdf, dated February 13, 2020

4) **TDP Review** – It was accepted by the SBOE that the Technical Data Package (TDP) update review was completed under federal certification by SLI and Pro V&V (Dominion Suite 4.14.E) confirmed completeness with 2005 VVSG Version 1 requirements.

5) **Election Management Testing (EMS)** – The SBOE Election Operations Unit used NYS Certified EMS suite 4.9.17 (12/10/2012) in the current upgrade testing of the ICP to:

   a) Prepare iButtons.
   b) Generate election configuration files.
   c) Write ('burn') compact flash (CF) Cards (Primary and Backup).
   d) Generate results using Results Tally and Reporting (RTR) (printing of reports, logs, etc.).

5 TESTING PERFORMED BY NYSTEC

5.1 DOMINION ICE 4.14.30 UPGRADE

As per recommendations from SLI, NYSTEC performed testing on this component of the Dominion System:

Product	Software Version
Dominion ICE	v.4.14.30

Dominion ICE 4.14.30 upgrade included the following new features:

- Printer replacement for discontinued Addmaster KR-85 printer module to current model Addmaster KR-85A (with new firmware)
- New memory card export ability available through Tech Menu for unit software verification by checking hash value

NYSTEC performed the following testing:

- Review of TDP changes to ensure updates meet applicable TDP requirements, and contain all necessary information pertaining to the documented changes for this system (See Appendix B, below).

- Security testing to ensure changes to not compromise current security controls, create new risks or violate NYS Laws or Regulations.

- Functional tests for new memory card export ability (See section 6.1.2, below):

    - Verify accuracy in the documentation describing the firmware export process.

    - Verify memory content is accurately transferred.

- Functional Tests for new printer replacement for discontinued Addmaster KR-85 printer module to current model Addmaster KR-85A and new firmware (See section 7.1.1, below):

    - Create ballots via an accessible session (aka BMD mode), scan and verify to ensure the new printer prints the ballots correctly

5.2 DOMINION ICP 4.9.13

As per recommendations from SLI NYSTEC performed the following testing on the following component of the Dominion System:

Product	Software Version
Dominion ICP	v.4.9.13

Dominion ICP 4.9.13 upgrade included the following change:

- Improvement to ballot processing to decrease the amount of ballot ID misreads

- Review of TDP changes to ensure updates meet applicable TDP requirements, and contain all necessary information pertaining to the documented changes for this system (See Appendix B, below).

- Security testing to ensure changes to not compromise current security controls, create new risks or violate NYS Laws or Regulations.

- Functional testing for the modification due to the change in ballot processing. This allowed the verification of if the amount of misread ballots are acceptable (See section 7.1.1, below).

- Functional testing of a set of general and primary elections with a mixture of correctly voted ballots as well as over- and under-voted ballots. Tabulated and completed the ballot adjudication process (See section 7.1.1, below).

6 NYSTEC REVIEW OF SECURITY OF THE CHANGES

6.1 DOMINION ICE 4.14.30 SECURITY TESTS

ICE Printer Replacement

As the specs of the printer unit did not change, there are no security NYS Laws or Regulations that pertain to this change. The only issue the printer can have for security is if the printer does not fit correctly or new cabling can be accessed to hamper the printer functionality. The positioning of the printer and cabling was examined by NYSTEC, and we concluded there is no physical security issue created by the new printer.

ICE Firmware Extraction Utility

If this functionality does not work correctly, software integrity verification (aka hash check) of device will show false results.

The new functionality uses software installed on the system (accessible from the "Tech Menu") to copy the firmware to the CF card in the CF1 slot. This violates VVSG 7.4.6.b.i (see below and note that the VVSG has this as a "should", but NYS regulations changes the "should" to a "shall"). Thus, NYSTEC believes counties should not use this for pre-qualification testing and should continue to use the current documented procedures for the ICE to perform the software integrity check (aka "hash check").

Excerpt from 2005 VVSG, Vol 1.:

7.4.6 Software Setup Validation

a. Setup validation methods shall verify that no unauthorized software is present on the voting equipment.
b. The vendor shall have a process to verify that the correct software is loaded, that there is no unauthorized software, and that voting system software on voting equipment has not been modified, using the reference information from the NSRL or from a State designated repository.
*i. The process used to verify software ~~should~~ **shall** be possible to perform without using software installed on the voting system.*
ii. The vendor shall document the process used to verify software on voting equipment.
iii. The process shall not modify the voting system software on the voting system during the verification process.
c. The vendor shall provide a method to comprehensively list all software files that are installed on voting systems.

*d. The verification process ~~should~~ **shall** be able to be performed using COTS software and hardware available from sources other than the voting system vendor.*

i. If the process uses hashes or digital signatures, then the verification software shall use a FIPS 140-2 level 1 or higher validated cryptographic module.

ii. The verification process shall either (a) use reference information on unalterable storage media received from the repository or (b) verify the digital signature of the reference information on any other media.

e. Voting system equipment shall provide a means to ensure that the system software can be verified through a trusted external interface, such as a read-only external interface, or by other means.

i. The external interface shall be protected using tamper evident techniques ii. The external interface shall have a physical indicator showing when the interface is enabled and disabled

iii. The external interface shall be disabled during voting

*iv. The external interface ~~should~~ **shall** provide a direct read-only access to the location of the voting system software without the use of installed software*

6.2 DOMINION ICP 4.9.13 SECURITY TESTS

ICP Better ballot recognition

This change does not affect any external interfaces on the device, nor does it affect any existing internal security controls. Therefore, there are no security implications or any NYS Laws or Regulations to be tested or reviewed.

7 NYSTEC FUNCTIONAL TESTS PERFORMED FOR THE ICE V4.14.30 AND ICP V4.9.13

7.1 DOMINION ICE 4.14.30 AND ICP 4.9.13 FUNCTIONAL TESTS

NYSTEC's functional test review was validated by such activities as voting simulation and reviewing documentation to verify that:

- The proposed upgrades to the printer module and firmware work as documented.
- The expected results were observed in the testing executed by the NYSTEC functional tester.
- Ballots were processed by ICE and ICP without error.

- The proposed changes did not pose any apparent negative impact on the accurate tally of election results or results reports.
- The proposed export function works as documented.

7.1.1 DOMINION ICE 4.14.30 AND ICP 4.9.13 PRINTER REPLACEMENT AND BALLOT SCANNING FUNCTIONAL TESTS

The tests included for printer replacement and ballot processing include:

- General Election – Ballot Sizes 14", 17", 22".
- Primary Election – Ballot Size 14", 17".
- Accessible (BMD) session with a sample size of 5 for each ballot size and style.

The following list provides the test scripts performed:

General Election:

- Script - DOMG14LCert2017: Test script verified that Dominion ICE Scanner/BMD can process a 14-inch ballot with 8 gridlines and multiple layout conditions.
- Script - DOMG17L11Cert2017: Test script verified that Dominion ICE Scanner/BMD can process a 17-inch ballot with 9 gridlines and multiple layout conditions.
- Script - G22LC0100457: Test script verified that Dominion ICE Scanner/BMD can process a 22-inch ballot with 12 gridlines and multiple layout conditions.

Primary Election:

- Script – DOM17LCR: Test script verified that Dominion ICE Scanner/BMD can process a 14-inch ballot with 2 gridlines and multiple layout conditions.
- Script – GG22LEC0100457: Test script verified that Dominion ICE Scanner/BMD can process a 22-inch ballot with 9 gridlines and multiple layout conditions.

For each script the following tasks were performed:

- Scanning paper ballot test deck.
- Scanning of ballots on ICE and ICP.
- BMD marking of ballots on ICE and ICP.
- Reviewing audit logs on ICE and ICP.
- Reviewing reports on ICE and ICP.
- Reviewing printed ballots for accuracy.
    1. Contests.
    2. Candidates.
    3. Proposals.

- Reviewing election artifacts.
    1. Audit Log (SLOG.txt).
    2. Zero Report Tape printed by the tabulator.
    3. Results Tapes (Polls Closed Report printed by the tabulator).
    4. New York Statement of Votes Cast (NYSOVC) Report.
    5. Results per Tabulator.

7.1.2 DOMINION ICE 4.14.30 NEW MEMORY CARD EXPORT CAPABILITY FUNCTIONAL TESTS

The test for new memory card export capability followed the following steps:

- Following the Dominion provided export instructions to export the CF0 card to the CF1 card, confirming the new export feature from the ICE allows for voting system software verification.
- Running a hash check on that CF1 card and comparing the results to the hash value sent by SLI for the Trusted Build. This validates 1) that the SLI Trusted Build was installed and 2) that the export process works correctly

7.2 FUNCTIONAL TEST RESULTS

NYSTEC made the following observations during functional testing:

- The test scripts produced vote totals that matched the expected vote totals of the test decks during the run for record testing. The results reports generated from the Dominion ICE (precinct-based optical scanner) and Dominion ICP (precinct-based optical scanner) match the vote totals generated by the Dominion "Results Tally and Reporting" (RTR) module. The audit logs generated from the ICE and ICP produced records that displayed no anomalies, the new KR-85A printer module printed without issues and the ICP experienced no ballot ID misreads during testing.

- NYSTEC successfully followed the Dominion provided export instructions confirming that the new export feature from the ICE allows for voting system software verification by exporting CF0 card to the CF1 card. Additionally, NYSTEC ran a hash check on CF1 validating that the SLI Trusted Build was installed and verifying the export feature works correctly. NYSTEC recommends including instruction if the export fails and for the user to contact SBOE Voting Operations for assistance.

8 FINDINGS/OBSERVATIONS/RECOMMENDATIONS

1) **Addmaster KR-85A Printer Module Replacement**

Background:

Based on observations made through functional testing and security review, the new KR-85A printer module and firmware functions without issue and can seamlessly fit into the same physical space as the prior model.

Recommendation:

As a result of functional test outcomes, the TDP review and the security tests, NYSTEC recommends the certification of ICE v4.14.30.

2) **ICE System Card Export Procedure**:

Background:

Dominion provided export instructions for the new export feature from the ICE that allows for voting system software verification by exporting CF0 card to the CF1 card to assist with verifying the hash value of the software build which was successfully followed by NYSTEC. Additionally, NYSTEC ran a hash check on CF1 validating that the SLI Trusted Build was installed.

Recommendation:

NYSTEC observed that the instruction is provided only when export is successful and recommends including instruction if the export fails. Additionally, should a failure occur, the user should be directed to contact SBOE Voting Operations for assistance. Otherwise, NYSTEC has concluded the new function works without error and the instructions provide sufficient guidance. However, because of the way the function violates VVSG 7.4.6.b.i (See section 6.1 above, for details) NYSTEC cannot recommend approving to use the function as part of the pre-qualification testing.

3) **Improvement to Ballot Processing to Decrease the Amount of Ballot ID Misreads:**

Background:

Dominion made changes to ICP v4.9.13 to improve ballot processing to decrease the amount of ballot ID misreads. NYSTEC did not experience any misreads of ballot IDs when working with different ballot styles or sizes during functional testing. However, no baseline accuracy metric was available prior to testing.

Recommendation:

NYSTEC recommends that the change to v4.9.13 be accepted based on functional test results and that future performance improvements establish baseline metrics, so the tester has a point of reference to validate vendor claims.

9 CONCLUSION

The Dominion ImageCast Evolution (ICE) 4.14.30 and ImageCast Precinct (ICP) are part of the Federally Certified Dominion Suite 4.14.E that was tested by Independent Testing Authorities (ITA), PRO V&V and SLI, while also being certified by Election Assistance Committee (EAC).

The SBOE Election Operations Unit engaged ITA PRO V&V for primary source code and TDP review and ITA SLI for secondary source code and TDP review. SLI also constructed the Trusted Build for the ICE v4.14.30 and ICP v4.9.13. PRO V&V and SLI both tested the Federal Certification Testing Results, Source Code Review, 2005 VVSG, NYS Election Law and NYS Regulations against ICE v4.14.30 and ICP v4.9.13 (See Appendix A – Security Requirements Verified by SLI – Security Requirements Verified by SLI).

As informed by NYSTEC's functional testing activities, the Dominion ICE v4.14.30 and ICP v4.9.13 upgrades worked as documented and did not have any apparent negative impact on the accurate tally of election results or results reports. However, because of the way the firmware extract function violates VVSG 7.4.6.b.i (See section 6.1 above, for details) NYSTEC cannot recommend approving to use the function as part of the pre-qualification testing

APPENDIX A – SECURITY REQUIREMENTS VERIFIED BY SLI

File name(s): NYSBOE DVS (ICE) 4.14.30 Source Code Review Report v1.0.pdf; NYS BOE DVS (ICP) 4.9.13 Source Code Review Report v1.0.pdf

Criterion	VVSG 2005	Exempted by Accepted Standard	Covered by Understand Review and Results
Self-modifying code	v.1: 5.2.2		Yes
Specific function	v.1: 5.2.3.a		Yes
Module has unique name	v.1: 5.2.3.b		Yes
Module has header	v.1: 5.2.3.b, 5.2.7 (a, a.1-a.6)		Yes
Required resources	v.1: 5.2.3.c		Yes
File's functions' line count	v.1: 5.2.3.d, v.2: 5.4.2.i	Yes	Yes
Single Entry Point	v.1: 5.2.3.e		Yes
Criterion	**VVSG 2005**	**Exempted by Accepted Standard**	**Covered by Understand Review and Results**
Single Exit Point	v.1: 5.2.3.e		Yes
Control structures	v.1: 5.2.3.f		Yes
Acceptable Constructs	v.1: 5.2.4.a, v2: 5.4.1		Yes
Vendor Defined Constructs with Justification	v.1:5.2.4.a.i		Yes
Execution through Control Constructs	v.1:5.2.4.a.ii		Yes
Program re-direction	v.1:5.2.4.a.iii		Yes
Class, function and variable names	v.1:5.2.5.b, v.1:5.2.5.c	Yes	

Keyword	v.1: 5.2.5.d	Yes	
Variables	v.1: 5.2.7.b	Yes	Yes
In-Line Comments	v.1: 5.2.7.c	Yes	Partial
Assembly code	v.1: 5.2.7.d	Yes	Yes
Comments in uniform format	v.1: 5.2.7.e	Yes	Yes
Uniform calling sequences	v.2: 5.4.2.a	Yes	Yes
Parameters type and range validation	v.2: 5.4.2.a	Yes	Yes
Explicit return values	v.2: 5.4.2.b	Yes	Yes
Macros	v.2: 5.4.2.c	Yes	Yes
Unbound arrays	v.2: 5.4.2.d	Yes	Yes
Pointers	v.2: 5.4.2.e	Yes	Yes
Case statements	v.2: 5.4.2.f	Yes	Yes
Vote counter overflowing	v.2: 5.4.2.g	Yes	Yes
Indentation	v.2: 5.4.2.h	Yes	Yes
Code generator	v.2: 5.4.2.j	Yes	Yes
Line length	v.2: 5.4.2.k	Yes	Yes
Executable statement	v.2: 5.4.2.l	Yes	Yes
Embedded executable statement	v.2: 5.4.2.m	Yes	Yes
Criterion	**VVSG 2005**	**Exempted by Accepted Standard**	**Covered by Understand Review and Results**
Mixed-mode operations	v.2: 5.4.2.n	Yes	Partial
Exit() message	v.2: 5.4.2.o	Yes	
Format of messages	v.2: 5.4.2.p	Yes	Yes
References variables	v.2: 5.4.2.q	Yes	Yes
Levels of indented scope	v.2: 5.4.2.r	Yes	Yes

Variable initialization	v.2: 5.4.2.s	Yes	Yes
Constant Definitions	v.2: 5.4.2.t	Yes	Yes
Ternary Operator	v.2: 5.4.2.u	Yes	
Assert() statement	v.2: 5.4.2.v	Yes	

New York Election Law	
NYS 2007 Election Law 7-202.1f	A voting machine or system to be approved by the state board of elections shall: f. be provided with a "protective counter" which records the number of times the machine or system has been operated since it was built and a "public counter" which records the number of persons who have voted on the machine at each separate election;
NYS 2007 Election Law 7-202.1ri	A voting machine or system to be approved by the state board of elections shall: r. ensure the integrity and security of the voting machine or system by: (i) being capable of conducting both pre-election and postelection testing of the logic and accuracy of the machine or system that demonstrates an accurate tally when a known quantity of votes is entered into each machine
NYS 2007 Election Law 7-202.1rii	A voting machine or system to be approved by the state board of elections shall: r. ensure the integrity and security of the voting machine or system by:

New York Election Law	
	(ii) providing a means by which a malfunctioning voting machine or system shall secure any votes already cast on such machine or system
NYS 2007 Election Law 7-202.1t	A voting machine or system to be approved by the state board of elections shall: t. not include any device or functionality potentially capable of externally transmitting or receiving data via the internet or via radio waves or via other wireless means.
NYS Regulation 6209.2.F.1a	(1) The voting system shall print and display a paper record of the voter's ballot choices prior to the voter making the ballot choices final. In the case of a paper-based voting system, the ballot marked by the voter shall constitute the paper record referred to in this Section F. (a) The paper record shall constitute a complete record of ballot choices that can be used in audits of the accuracy of the voting systems electronic records, in audits of the election results, and in full recounts.
NYS Regulation 6209.2.F.4b	(4) The voting system shall allow the voter to approve or reject the paper record, in the case of DRE systems, marking the ballot as such in the presence of the voter. (b) Prior to reaching the maximum number of ballots allowed pursuant to statute, any DRE voting system shall display a warning message to the voter indicating the voter may reject only one more ballot, and that the third ballot shall become the ballot of record.

New York Election Law	
NYS Regulation 6209.2.F.10a	(10) The voting system's ballot records shall be structured and contain information so as to support highly precise audits of their accuracy. (a) All cryptographic software in the voting system shall have been approved by the U.S. Government's Crypto Module Validation Program (CMVP) as applicable.
NYS Regulation 6209.2.F.12	(12) The voting system shall generate and store a digital signature for each electronic record.
NYS Regulation 6209.2.F.13	(13) The electronic records shall be able to be exported for auditing or analysis on standards-based and/or information technology computing platforms.
NYS Regulation 6209.2.F.13b	(13) The electronic records shall be able to be exported for auditing or analysis on standards-based and/or information technology computing platforms. (b) The voting system shall export the records accompanied by a digital signature of the collection of records, which shall be calculated on the entire set of electronic records and their associated digital signatures.
NYS Regulation 6209.2.G	Any submitted voting system's software shall not contain any code, procedures or other material which may disable, disarm or otherwise affect in any manner, the proper operation of the voting system, or which may damage the voting system, any hardware, or any computer system or other property of the State Board or county board, including but not limited to 'viruses', 'worms', 'time bombs', and 'drop dead' devices that may cause the voting system to cease functioning properly at a future time.

New York Election Law	
NYS Regulation 6209.6F3	(3) Software Specification The Software Specification shall contain and describe the vendor's design standards and conventions, environment and interface specifications, functional specifications, programming architecture specifications, and test and verification specifications. Vendor must also provide document identification, an abstract of the specification, configuration control status and a table of contents. The body of the specification shall contain the following material:
NYS Regulation 6209.6F3n2	(3) Software Specification: The Software Specification shall contain and describe the vendor's design standards and conventions, environment and interface specifications, functional specifications, programming architecture specifications, and test and verification specifications. Vendor must also provide document identification, an abstract of the specification, configuration control status and a table of contents. The body of the specification shall contain the following material. (n) Security 2. For each potential point of attack, the vendor shall identify the technical safeguards embodied in the voting system to defend against attack, and the procedural safeguards that the vendor has recommended be followed by the election administrators to further defend against that attack. Each defense shall be classified as preventative, if it prevents the attack in the first place; detective if it allows detection of an attack; or corrective if it allows correction of the damage done by an attack.

New York Election Law	
NYS Regulation 6209.6F3n3	(3) Software Specification: The Software Specification shall contain and describe the vendor's design standards and conventions, environment and interface specifications, functional specifications, programming architecture specifications, and test and verification specifications. Vendor must also provide document identification, an abstract of the specification, configuration control status and a table of contents. The body of the specification shall contain the following material. (n) Security 3. Security requirements and provisions shall include the ability of the system to detect, prevent, log and recover from the broad range of security risks identified.
NYS Regulation 6209.6F3o	(3) Software Specification: The Software Specification shall contain and describe the vendor's design standards and conventions, environment and interface specifications, functional specifications, programming architecture specifications, and test and verification specifications. Vendor must also provide document identification, an abstract of the specification, configuration control status and a table of contents. The body of the specification shall contain the following material. (o) Programming Specifications The vendor shall provide an overview of the software design, structure and implementation algorithms. Whereas the Functional Specification of the preceding section provides a description of what functions the software performs and the various modes in which it operates, this section should be prepared so as to facilitate understanding of the internal functioning of the individual software modules. Implementation of functions shall be described in terms of software architecture, algorithms and data structures and all procedures or procedure interfaces which are

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	vulnerable to degradation in data quality or security penetration shall be identified.
BMD 2.3.3	Ballots shall include machine-readable code and also human readable code, to identify different ballot styles.
BMD 2.6.3	The BMD shall contain software and hardware required to perform a diagnostic test of system status, to demonstrate that the system is fully operational and that all voting positions are operable.
BMD 2.7.1	a BMD shall meet the following provisions: Be constructed so as to allow for a voter to mark a paper ballot for all candidates who may be nominated and on all ballot proposals which may be submitted.
BMD 2.7.2	a BMD shall meet the following provisions: The BMD shall provide a method for a voter to mark a paper ballot indicating their selection for any person for any office, whether or not nominated as a candidate (write-in) by any party or independent body.
BMD 2.7.3	a BMD shall meet the following provisions: Be constructed so that a voter cannot mark a ballot for a candidate or for a ballot proposal for whom or on which he or she is not lawfully entitled to vote.
BMD 2.7.4	a BMD shall meet the following provisions: The BMD must prevent voters from over-voting and indicate to the voter specific contests or ballot issues for which no selection or an insufficient number of selections has been made, and provide the voter with the opportunity to correct the ballot before the ballot is marked.
BMD 2.7.5	a BMD shall meet the following provisions: Provide an opportunity such that any voter, including voters who are blind or visually impaired, may privately and independently verify their selections and the ability to privately and independently change such selections or correct any error before the ballot is marked.

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BMD 2.7.6	a BMD shall meet the following provisions: Provide a feature to permit a voter to independently verify their paper ballot after it has been marked, including voters who are blind or visually impaired.
BMD 3.6.1.3	3.6.1. BMD and other devices accessible to individuals with disabilities, must be approved for use by the NYSBOE prior to use. Each complete BMD, all documentation prescribed herein, must be submitted to the NSYBOE for testing purposes no later than 11 am Eastern Standard Time ten (10) business days after a bid opening. Deliveries must be completed as inside delivery and include the following: 3.6.1.3. The election management software.

APPENDIX B – DOCUMENTATION REVIEWED FOR ICE AND ICP UPGRADE

Documentation Reviewed for ICE v4.14.30 and ICP v4.9.13 Upgrade	
2. - Democracy Suite System Change Notes	ImageCast Precinct Firmware Build and Install Version 4.9-NY::109
2.05 – ImageCast Evolution Software Design and Specification Version 4.14E::181	Application For Modification Of Certified Voting System
ImageCast Evolution Firmware Build Prerequisites Setup and Installation Version 4.14.D::100	Change Notes for D-Suite NYS Modifications
ImageCast Evolution Firmware Installation Procedure Version 4.14.D::103	Dominion Voting Systems ImageCast Printing Specification
ICE System Card Export Procedure	New York State Board of Elections Test Deck Procedure
SLI NYSBOE Dominion Source Code Review Findings ImageCast Precinct v1.0 February 13, 2020	SLI Dominion Source Code Review Findings ImageCast Evolution v1.0 February 13, 2020
PRO V&V Letter Report January 2, 2020 ICE Software Version 4.14.30 and ICP 4.9.13	PRO V&V Dominion Voting Letter of Change December 4, 2019
PRO V&V Engineering Change Order (ECO) Analysis Form December 17, 2019	Dominion Voting Engineering Change Order (ECO) Form ECO Number 100657
U.S. Election Assistance Commission Re: ECO DVS 100657 Approval	