



Voting System Anomaly Root Cause Analysis Template v2.0

Root Cause Analysis for:

VV40ECT-96: ISSUE WITH CREATING AND USING A NEW SYSTEM ADMINISTRATOR CARD IN VxADMIN
- REV. 1
VxSUITE, VERSION 4.0 AND EAC CERTIFICATION #VXS4

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Introduction

This RCA documents the investigation into an issue with testers reporting being unable to program a System Administrator card, with newly programmed cards being rejected as blank or invalid. Programming cards is a key function of the voting system, and so clarification of the cause of this anomaly is important.

Anomaly Description

Complete all sections. Descriptions must be as detailed as possible, while being clear and concise since the anomaly is the source of the entire RCA. This detail should include a complete list and/or description of the “symptoms” of the anomaly and the conditions present which the symptoms occurred.

<u>Date of Anomaly:</u> April 10, 2025	<u>Time of Anomaly:</u> 11:08am
<u>Place of Anomaly:</u> SLI, Wheat Ridge, CO	<u>Person identifying Anomaly:</u> Lekshmi Nath, SLI Compliance Jessica Myers, VotingWorks
<u>Expected Results of actions leading up to anomaly:</u> Newly created System Administrator cards programmed properly by VxAdmin machines should be recognized correctly and allow login without errors.	
<u>Detailed description of the event / anomaly:</u> When attempting to create a new System Administrator card using VxAdmin (Serial number: AD-11-007), the process completed with a new PIN being generated. However, upon reinserting the newly created card, it was recognized as a “Blank Card”. Additionally, when attempting to lock the machine and reinsert the newly created Admin card, the system displays an “Invalid Card” error and prompts to use a System Administrator card.	

EAC (Election Assistance Commission) Root Cause Analysis

If the anomaly is repeatable, provide step by step instructions to recreate it:

This issue is repeatable only in the context of the specific root cause detailed in this report: an invalid key/cert not appropriate for the software. To reproduce it:

1. Receive or use a card saved from an older version of the software being used in VxAdmin, e.g. a card from before v4.0.1 when using v4.0.1+ software.
2. Attempt to program and use the Admin card. Navigate to the Smart Cards tab, insert a card. Observe the screen displaying “Blank Card...” and a warning message. Click the “Program System Administrator card” button. In the pop-up window, click the “Program System Administrator card” button. Record the new PIN and remove the card.
3. Insert the newly created Admin card again and observe the screen displaying “Blank Card”. Click the “Lock Machine” button. Insert the newly created Admin card and observe the error message “Invalid Card” and “use a system administrator card”.

Chronology of Events / Timeline

Provide a detailed chronology of the events leading up to, and following, the anomaly. Add additional events if necessary.

ID	Date/Time	Description	Entity Org/person	Result / Notes
1	April 10, 2025, 11:08am (Central Time)	SLI Compliance reports anomaly creating System Administrator cards.	Jessica Myers, Arsalan Sufi, Matt Roe, VotingWorks, with SLI	Initial reports were consistent with known behavior when cards are not configured for use properly, or when cards do not have a proper key from VotingWorks.
2	May 12, 2025	VotingWorks spoke with SLI about proper card configuration procedures.	Jessica Myers, VotingWorks	VotingWorks planned to receive the cards in question from SLI to confirm the issue, and to provide new cards with the issue corrected.
3	May 21, 2025, 10:46am	VotingWorks analyzes the received cards in use from SLI.	Arsalan Sufi, VotingWorks	VotingWorks confirms the received non-working cards from SLI were configured with the old pre-v4.0.1 key/cert. They were reconfigured with the appropriate v4.0.1+ key/cert. Other working cards were not altered, except a few cards configured for a user role different from the one printed on the card, and those were reset to prevent confusion. These cards were shipped back to SLI.
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Investigative Team and Method

This section shall describe how the investigative team is assembled by the voting system manufacturer, who it consists of, and how it gathers the data to be used in the analysis. Include the RCA method employed by the manufacturer in conducting the analysis and why this method was used.

Names and Positions of members of the investigation team:
Jessica Myers, Head of Compliance
Arsalan Sufi, Head of Software
Matt Roe, Head of Product
Describe the data gathering process:
After initial reporting of the anomaly to Jessica Myers, other VotingWorks staff analyzed the description of the error. Arsalan Sufi and Matt Roe as Heads of Software and Product respectively recognized the reported card errors as known behaviors in specific conditions related to limiting card access for security reasons. More communication with SLI confirmed the procedural issues leading to the anomaly.
Describe which methodology(s) is used to conduct the root cause analysis:
A “5 Why’s” approach was used, questioning why the described behavior with the programmed cards would surface. Early answers identified that this is known VxAdmin system behavior from improperly configured cards, either if the date in VxAdmin is configured too far in the future or in the past, or if an older outdated secure key was configured onto the card. Deeper questioning led to more discussions with SLI, confirming that what they saw was consistent with the old key/cert being on the card. Getting the physical cards would then allow analysis to confirm that.

Findings and Root Cause

Describe the findings of the investigation and explain the root cause(s) based on these findings. If the RCA results in findings that are not directly related to the root cause of the anomaly, these should also be captured as manufacturer product/process improvement steps in an effort to improve the voting system.

The cards registering as invalid after VxAdmin programming were configured with VotingWorks's old pre-v4.0.1 key/cert. As a reminder, VotingWorks updated its root private key and cert during the transition from v4.0.0 to v4.0.1. VotingWorks, while onsite at SLI in January, reconfigured SLI's cards that they already had with the latest v4.0.1+ key/cert, but some cards were missed during that visit.

Corrective Action(s)

SLI shipped VotingWorks the non-working cards, which VotingWorks has reconfigured with the latest v4.0.1+ key/cert such that they register on v4.0.1+ machines. This correction required shipment to VotingWorks because the procedure requires possession of the root VotingWorks key, which SLI does not have access to.

The exact details of the procedure are laid out here in our TDP:

<https://docs.voting.works/vxsuite-tdp-v4/system-security-auditing-and-logging/system-security-architecture/access-control#configuration-at-votingworks-facility>

Solution Management

The purpose of this section is to manage the corrective action(s) moving forward. This should detail all process changes to manage those corrective actions, and steps taken to ensure the actions eliminate the anomaly over time.

Customers should never encounter this card anomaly as VotingWorks controls card shipments, ensuring that customers receive cards compatible with their equipment (see link above for process details in the TDP). Customers do not receive smart cards needing reconfiguration the way a test facility like SLI might.

Finally, we do not anticipate having to reconfigure SLI's smart cards as we proceed through cert and upgrade to v4.0.2+. We intend to use the current root VotingWorks key and cert for the foreseeable future.