# HART Intercivic

The Hart InterCivic voting system was re-examined in Austin on May 25, 2005.
The version number of the changed systems are as follows:

BOSS - version 4.1.4 – ballot design and generation sub-system
BallotNow - version 3.1.0 – scanner used for deposition of mail-in ballots
eSlate – version 3.1.3 – DRE voting device
JBC – version 3.1.3 -Judges Booth Controller used with eSlate to select voters' ballot
Tally – version 4.1.1 – central-count accumulator and reporting sub-system
Rally – version 2.1.1 – regional or central MBB uploading (throughput enhancement)
SERVO – version 4.0.2 – used to extract audit data from eSlates and JBC's
eScan – version 1.0.3 – scanner to read paper ballots
eCM – version 1.0.7 – used to generate security keys

Collectively, the component piece make up Hart's System 5 voting system.

The entire system was reviewed since all components have been modified since the previous examination. The eScan is a new addition to the system. It provides an optical scan ballot alternative to the eSlate DRE for the majority of a precinct's voters. A jurisdiction using the Hart system will still need an eSlate in each polling location to meet the HAVA requirements, but the eScan is more economical and has the added benefit of the paper ballot which is the ultimate audit trail.

## Findings

*VOTING*

The system recorded and accumulated the examiners ballots cast on the eSlates and eScan correctly.

*eSCAN*

The eScan device uses the same algorithms as the BallotNow system to determine a voters selection. The scanner first adjusts itself based on marks printed on the ballot before it reads the selections which will compensate for any printer skewing of the ballots. BallotNow is sold in conjunction with the eSlate so that it can be used to produce the blank ballot images used in the eSlate.

There is no need for a "resolution" screen with the eScan since the voter inserts the ballot into the device. The eScan can be programmed to return the ballot to the user when a race is overvoted or undervoted.

The eScan creates a CVR (cast vote record) as well as accumulates totals. When the polls are closed the CVR's, which are loaded onto the MBB (mobile ballot box), are transfered to Tally. The aforementioned accumulated totals are consolidated with the eSlate(s) totals to produce the precinct totals report.

Tally will indicate how many votes were cast on the eScan versus the eSlate systems for a precinct. If the jursidiction has only one voter use the eSlate in a precinct, the voters choices remain private because Tally does not indicate voter choice by device (eSlate vs. eScan).

*SECURITY*

Unauthorized access to the sub-systems is tharted by use of a SHA-1 encryption key. The key is loaded onto a USB key fob (dongle) which is required to gain access (along with passwords) to the BOSS and Tally sub-systems. The keyfob can only be copied with Hart software because it requires a secret PIN#. The other sub-systems (eSlate and eScan) do not require the fob, but the key is still used to verify the validity of the election setup.

The SHA-1 encryption has recently been cracked by academians so it is not impossible to break. Hart should upgrade to the newly developed SHA-256 specification.

The Sybase database used by BOSS and TALLY is encrypted. Access is generally done through the Hart programs, but if the software key is known, a person could make changes to the database with a SQL utility. Once the election setup has been finalize and "locked" by BOSS, the CRC verification would detect that the database has been changed.

Access to the operating-system from TALLY was prevented so that unauthorized and unlogged operations are prevented.

The vendor representative used a utility to zero-out the eScan votes. The utility is not sold but rather used by Hart techincians as a "quick and dirty" way clear votes. This action was not logged so the vendor must be diligent that it does not "get out". The utility requires a PC and cable so it is not likely that a malicious voter or corrupt election worker would be able to clear the votes without being noticed, even if they had the utility. The vendor stated that this utility can only clear the votes, not alter the votes. The existence of this utility does raise concern about what other utilities Hart possesses. Is there a utility that could be used to alter votes?

*SERVO*

One use of SERVO is to extract the CVR's and audit-logs from the eSlates and JBC's. This was demonstrated by Hart. The printouts of the audit logs and CVR's were clear and sufficiently detailed.

## Recommendations

The MBB's do not include the eScan and eSlate serial numbers, and ballots cast on each device, used in the precinct. The vendor should include this information in the audit-logs and on the MBB's. This would facilitate finding the correct devices should an audit of a precinct be needed. The eSlates numbers could be written to the MBB when the polls are opened. The eScan

numbers can be written when the polls are closed. If an eSlate is taken off-line during the election day, that should be logged.

The key fobs have an internal serial number. The software should keep track of the serial numbers (key fobs) used and produced by a jurisdiction.

Hart should disclose all utility programs that are written for any of the sub-systems.

Because SERVO is required to extract the audit logs from the eSlates and JBC's it should be bundled with any purchase of eSlates. Otherwise, a jurisdiction will not be able to audit the precinct results without Hart's help.

## Conclusion

The system meets the current requirements of the Texas Election Code. I recommend certification.

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