

## **DS200 Compact Flash Verification Test Report**

July 29, 2011

### **Purpose:**

Florida certified “ES&S *Release 4.0.0.3, Version 2*” voting system needs a modification to the DS200 Compact Flash firmware script. In the current 1.5.2.0 version, if the DS200 is powered up without a USB stick installed, a diagnostic system log file expands to a level that uses all available space in the partition that the log file resides. When the partition fills up, the DS200 intermittently becomes unresponsive. ES&S reports that the calibration information stored in that partition is overwritten.

ES&S indicated that no changes to the firmware are required to fix this problem. Small changes to scripts and one additional script are necessary to remedy the issue.

The objective of this test is to verify that DS200 firmware did not change and that the changes to the scripts are as specified by ES&S. A full functional test will also be conducted, including a Mass ballot count test to determine that the DS200 version 1.5.3.0 with the updated scripts continues to meet the applicable requirements of the Florida Voting Systems Standards (FVSS) and Florida Law. If Florida Division of Elections (FLDoE) approves this change, this voting system will formally be known in Florida as “ES&S *Release 4.0.0.3 Version 3*”

### **Test:**

1. Verify current and new version of Firmware are still the same (Compact Flash Card):
  - This activity includes using two DS200 scanners. One DS200 will have the 1.5.2.0, the other one will have the 1.5.3.0 Compact flash cards installed. Both compact flash cards will be burned just for this test. Both machines are turned on at 5:00 PM (without a thumb drive installed) and left on overnight. At 8:00 am the next morning, both compact Flash cards were removed. The Compact flash cards were labeled with their respective versions prior to testing. The compact flash cards are then to be hashed using a Linux hashing utility. The utility will list the sha1 hash for every file on every partition of the flash card. The results of the two hashes are to be compared for differences. A custom utility program is used compare the two lists and report any files that are found to have different hash values. The files with a different hash values will be individually compared manually to determine if the changes are as expected.
2. Multiple DS200 test:
  - A second test will be conducted with multiple DS200's to see if the machines will become unresponsive when the sys.log becomes full. The newly burned compact flash cards will be installed and the DS200's will be powered on and the touch screens calibrated. If you do not calibrate the touch screens on a newly burned compact flash card, the DS200 will be unresponsive. The machines will be powered down after 1 hour to determine the rate of data input to the sys.log file when there is no USB stick installed. The compact flash cards will be removed and hashed. The compact flash cards will be re-inserted and the machines will be powered up and left on over night. In the morning, an attempt will be made to shut the machines down normally. If the machines are unresponsive, the power button will be held down for thirty seconds to power down. The compact flash cards will then be removed and hashed.

## **Conclusion:**

### Test #1

In the morning, the DS200's were unresponsive, this was to be expected, the touch screen had not been calibrated. This will happen every time. The purpose of this test was to determine if the firmware had been changed and the least amount of interaction that might have changed files was desirable.

The two compact flash cards had a total of 12,460 files when the first test was completed. The sys.log file grew to 35,999,744 bytes in size. There were 17 files that did not hash to the same value. There were four binary files and thirteen ASCII text files. A byte by byte comparison was made of the binary files. The cause of the hash value difference was the internal build date. The ASCII files were also compared to verify and examine the changes that were made. There was a Linux script added called rotate.sh. The script file was examined to determine/verify its function. The script checks for log files bigger than 2 megabytes. When a log file gets bigger than 2 megabytes, the script is designed to rotate the old log file data out, making room for the new log file data to be written. There were four lines added to the script file xinitrc\_ds, two comments and two commands. The first command runs the script rotate.sh, the second command deletes the sys.log file if it exists. The comments explain the commands.

There were no changes made to the firmware. The changes made to the scripts were verified and were as expected.

### Test #2

Three DS200's with firmware version 1.5.2.0 were powered on for one hour with no USB stick installed. The compact flash cards were removed and hashed. The sys.log file grew as follows:

Machine A: 3,648,756 Bytes  
Machine B: 3,950,201 Bytes  
Machine C: 3,840,959 Bytes

The compact flash cards were re-installed and the three DS200's were left to run overnight. All three machines were able to be shutdown using the touch screen shutdown button. The compact flash cards were removed and hashed again. The sys.log file grew overnight as follows:

Machine A: 35,790,848 Bytes  
Machine B: 35,823,616 Bytes  
Machine C: 35,811,328 Bytes

The log files reached capacity before the morning. The DS200's were still able to be shutdown normally.