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# Introduction

The HCR-4 product connections are USB, UART, Ethernet, SmartCard and MSR. The UART controls the smartcard and MSR. If the UART stops working, so should the SmartCard and MSR.

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# Setup

The setup is the HCR-4 device connected to the laptop. Various test require either a python script, or the TeraTerminal (located at C:\Projects\HCR4\python\modules\UsbToSerial).

## Laptop connections and Tools:

* USB to Ethernet Dongle: Back/Top USB connector
* USB to serial cable: Right of keyboard/Top USB Connector
* USB: Right of keyboard/Bottom USB Connector

Tools

* Needle Nose plyers: Used to remove the power/serial cable if needed.
* Staple: This is in case you want to reset the tamper BOR (unplug and hold for 5 seconds)

## Test Order

Go ahead and power up the HCR-4 before booting up the laptop. Connect the cables per the Laptop connections and Tools: description.

Boot up system then run the tests in this order (MSR verify it worked, FCC Test for duration, MSR validate it still works during ESD testing)

1. MSR: Open USBtoSerial
2. After boot up complete (hit enter to see prompt) type “root”
3. Run MSR test: type */opt/maxim-ic/basic/examples/msr*
4. Pull out the card
5. Press *CNTL-C* to kill the program
6. Replace the card
7. Repeat steps 3 to 6, to repeat if desired.
8. Close USBtoSerial window when done with test.
9. FCC Test: Double click the “*fcc-hcr4-tamperAllOn*” during radiated emissions test.
10. After complete, use *CNTL-C* to stop the program or just close it.
11. Repeat step 1-7 to perform final MSR test, verifying MSR still works.

## MSR Test

This verifies the MSR card reading. This is run through TeraTerm.

It is run with C:\Projects\HCR4\python\modules\UsbToSerial

Connecting to terminal, hit enter.

If freshly reboot, then after boot up completes and password is requests type “root” without quotes (“”). This is automatically done by the FCC script, so if reboot didn’t occur, you should be already passed this step. Once root:

/opt/maxim-ic/basic/examples/msr

At this point the MSR should be armed. Pull out the card quickly and it should read:

0 d 5 B 4 4 4 4 4 4 6 5 3 4 2 9 5 6 9 4 ^ P U B L I C / J O H N ^ 0 9 0 1 2 0 1 1 0 0 0 0 0 0 3 5 9 0 0 0 0 0 0 4 4 4 4 4 4 6 5 3 4 2 9 5 6 9 4 = 0 9 0 1 2 0 1 1 0 0 0 0 3 5 9

This indicates the MSR is working. Once the test is complete hit “***CNTL-C***” and verify the test is no longer running by seeing the command prompt “[root@jibe-eek examples]#”.

## Main FCC Test

The code running the test is on the host laptop. This code is in:

C:\Projects\HCR4\python\modules

The test can be ran by double clicking the “*fcc-hcr4-tamperAllOn*” or “*fcc-hcr4-tamperAllOFF*” script. This opens a command prompt and begins to attach to COM4 (the USB-Serial connector) to obtain communication between the host and the HCR4 device.

Once established the host collects the device IP address which is used to ping the device. Each successful ping results in an Ethernet Count increment.

The UART test simply reads the current directory and if it receives data back it increments the UART Count.

The USB test reads the HCR-4 bus vendorId and ProductId, to verify the correct device is available and increments the USB count.

The SmartCard reads the ATR and verifies the card is there to increment the SmartCard count.

The tamper counters are summed and compared to 0 to increment the tamper counter. This requires the tampers to be triggered.

The RTC is printed each time. This should remain 0, and only have a value, if a tamper occurs. If the tamper occurs, the RTC will contain a number, and the triggered tamper numbers should print out.

The counter exist in the python script. Restarting the script, restarts all counters, except the RTC.

# Hardware

If a tamper occurs a half straightened staple can be used to reset the BOR reset switch. There are 2 holes on the bottom, next to the battery and closest to the side of the board (farthest from the battery). Feel for the button to depress and hold it for 5 seconds, this should clear the *last RTC Event* value.

# User Defines

The fcc-hcr4.py file has user defines.

##############USER DEFINED######################################################

##Overwrite Log location

my\_path = '..\\fcc\_log\\'

my\_name = 'fcc\_test'

tamper\_flag = '0' #0-OFF, f-tamper 0,1,2,3 active, 3f-All Tampers Active and triggered

##############USER DEFINED###############################################

The log destinations can stay.

You may want to modify which tampers will actively reboot the system if they occur.

## Disable All TAMPERS

fcc-hcr4.py file has user defines.

##############USER DEFINED###############################################

…

tamper\_flag = '0'

##############USER DEFINED###############################################

## Enable All TAMPERS

fcc-hcr4.py file has user defines.

##############USER DEFINED###############################################

…

tamper\_flag = '3f'

##############USER DEFINED###############################################

## Serial Port

This shouldn’t change for the laptop, but here just for clarity. Laptop should be always COM4. I connect the USB to serial cable into the top connector, to the right and the keyboard.

##################################################

#USER/Machine SPECIFIC, change UART to MATCH YOURS!!!!

port = 'COM4'

path = '..\log\\'

brk = '\\'

log\_name = 'check\_card\_log'

##################################################

## Ethernet

The HCR-4 uses a static IP address with a crossover cable to the laptop. It is assumed neither the laptop Ethernet or the HCR-4 will be plugged into a live network, only connect them together. HCR-4 device are programmed to use IP 1.70 and 1.72.

The laptop:

IP Address: 192.168.1.71

Subnet Address: 255.255.255.0

Default Gateway: 192.168.1.1

The HCR-4:

IP Address: 192.168.1.70

Subnet Address: 255.255.255.0

Default Gateway: 192.168.1.1

This is configured in the HCR-4 */etc/network/interfaces* file.

auto eth0

#iface eth0 inet dhcp – disabled to make static

# added static set up below

iface eth0 inet static

address 192.168.1.70

netmask 255.255.255.0

gateway 192.168.1.1