

CT523 Upgrade Guide

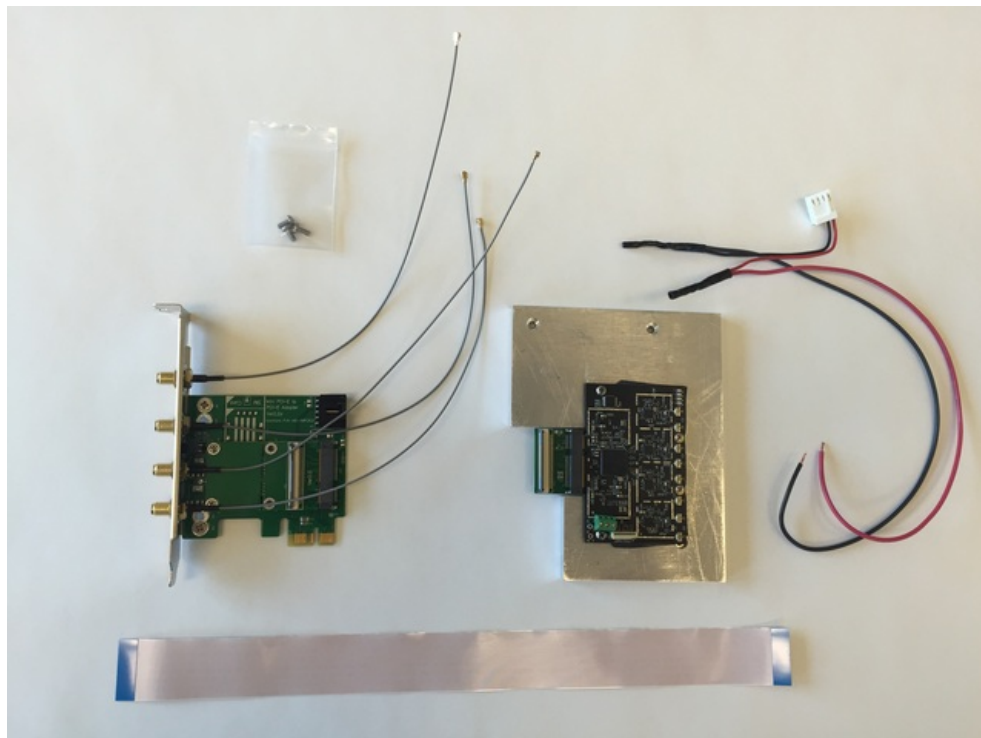
Installing a 4x4 MU-MIMO 802.11ac NIC with Heatsink

Overview

1. Prepare inner chassis screw taps.
2. Attach heatsink to inner chassis.
3. Attach NIC to heatsink.
4. Install mini-PCI-E adapter.
5. Attach PCI-E ribbon cable.
6. Attach antenna pigtail cables.
7. Attach 5v power supply cable.
8. Enable VT-d in BIOS.
9. Install LANforge 5.3.4.
10. Enable 10.4 NIC Firmware.

Overview

The CT523 multi-radio system can be upgraded with a 4x4 MU-MIMO 802.11ac NIC. This NIC requires an additional 5v power supply as well as a custom heatsink. The upgrade kit contains all of the parts necessary to perform the upgrade. After the upgrade, LANforge version 5.3.4 or later should be installed including new firmware and kernel. For the newer QCA9984 4x4 chipset NIC, you need LANforge 5.3.5 or later.



Included in the Upgrade Kit

Pre-assembled Components

4x4 MU-MIMO ath10k NIC and Heatsink with Ribbon Cable Adapter (5 x 4 inches)

Mini-PCI-E Adapter and Antenna Pigtail Cables with Ribbon Cable Adapter.

Additional Components

3 - Heatsink to Chassis screws (4/40 by 1/4).

1 - PCI-E Ribbon Cable.

1 - 5v Power Supply Cable.

Tools Needed

- Drill with a 11/32 (or similarly sized) bit suitable for metal.
- #1 Phillips Screwdriver.
- Small Flathead Screwdriver.
- Electrical Tape.

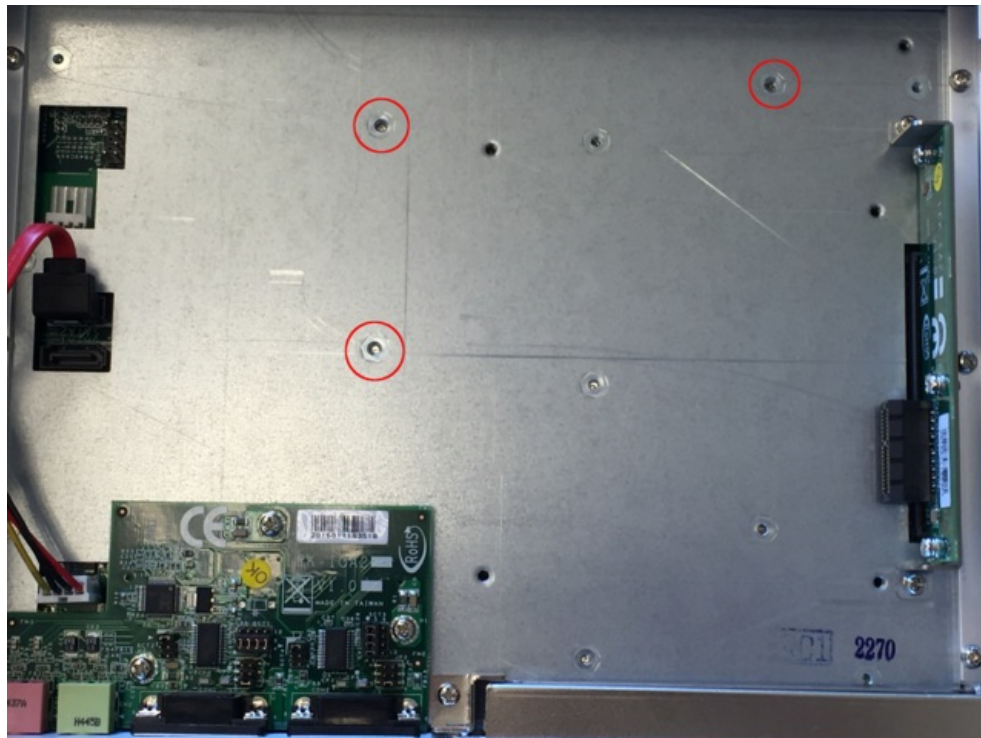
Installation Procedure

1. Prepare inner chassis screw taps

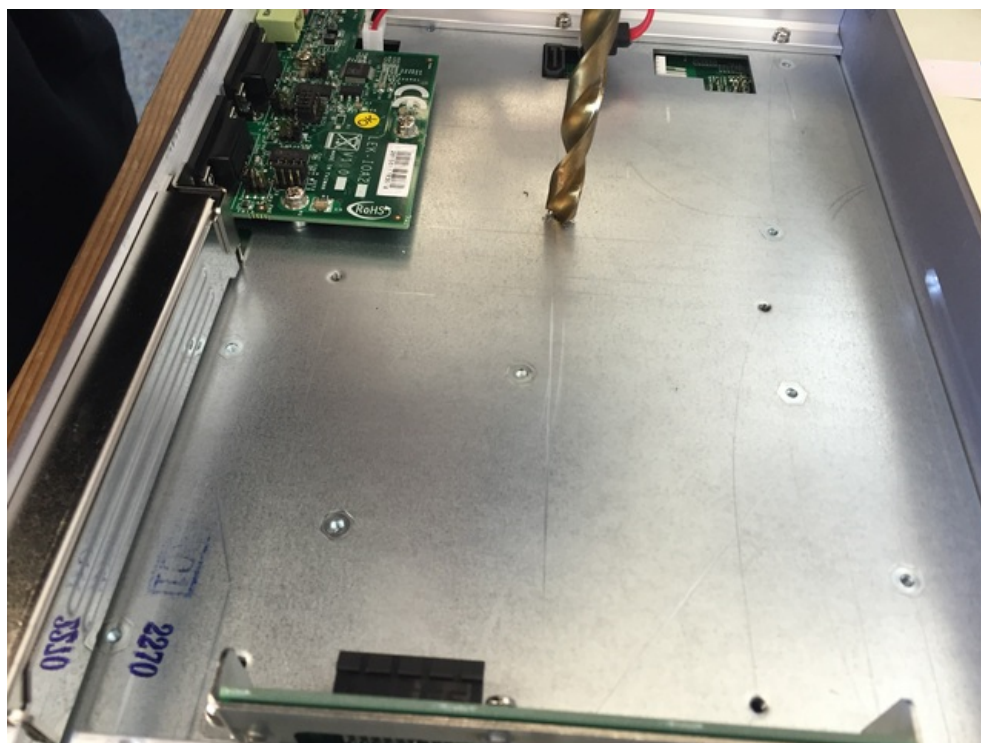
Remove the 4 rubber feet on the bottom side of the CT523 chassis and open the hinged case.



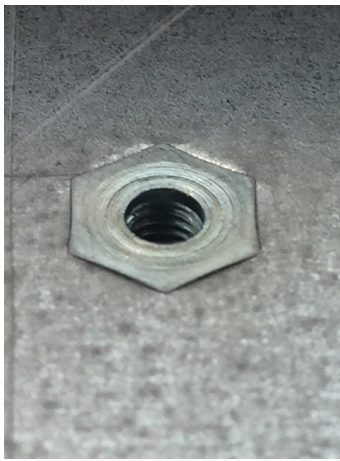
The three inner screw taps where the heatsink will attach to the chassis have a small metal ridge that must be removed to allow a screw to reach the threads.



Only drill at low speed for the minimum amount necessary.
The metal shavings can be removed with a piece of tape.



The goal is to allow the screw to properly contact the inner threads.



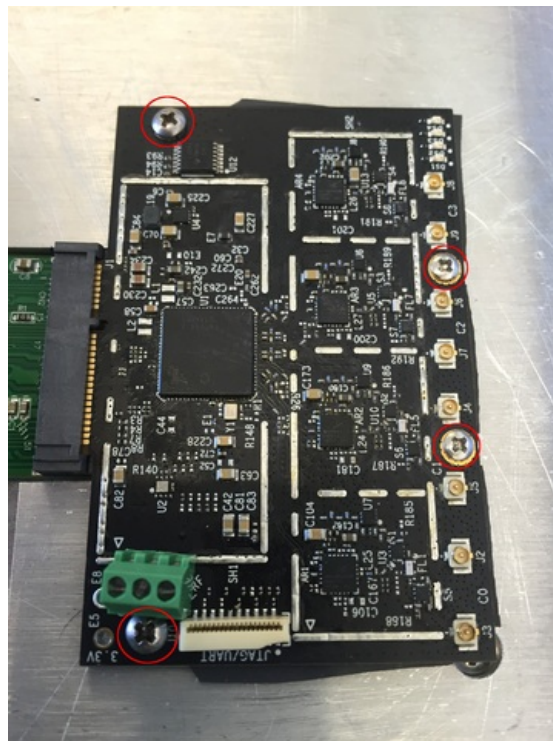
Before



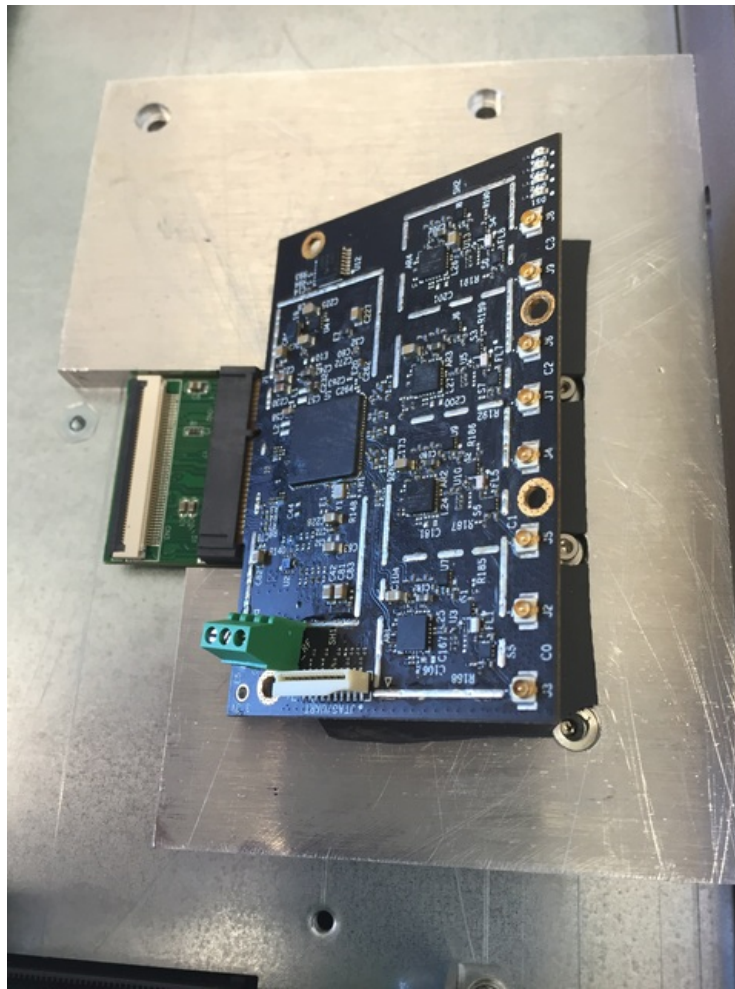
After

2. **Attach heatsink to inner chassis**

Remove 4 screws holding the NIC to the heatsink just so the NIC can be tilted up.



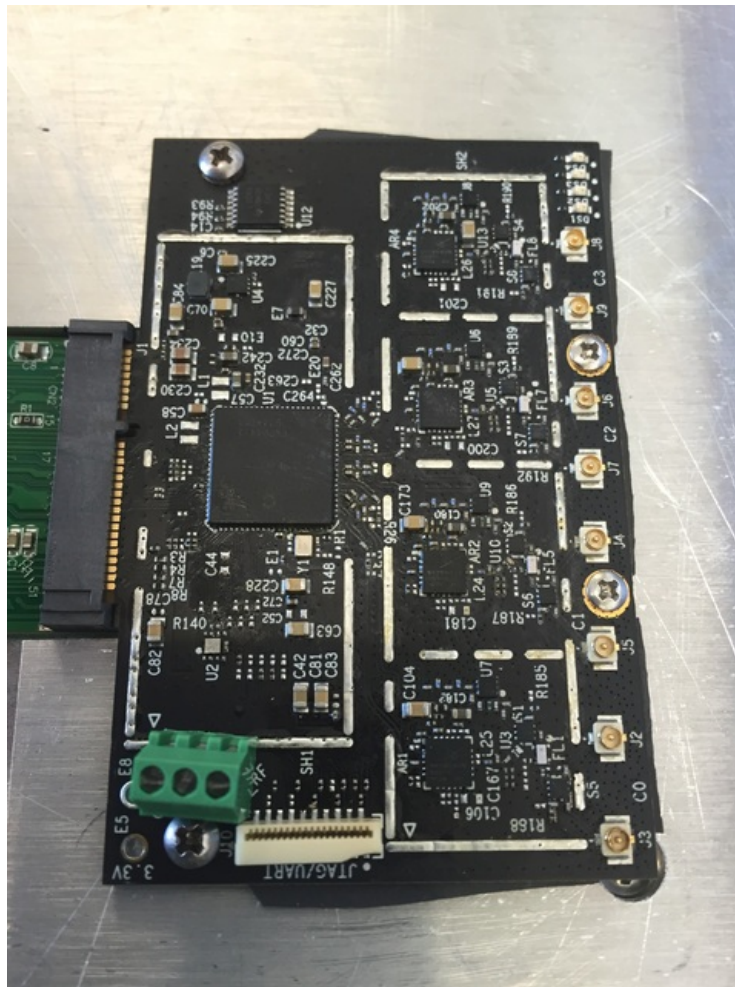
Place heatsink and NIC inside the chassis and attach with three 4/40 by 1/4 screws.



3. Attach NIC to heatsink

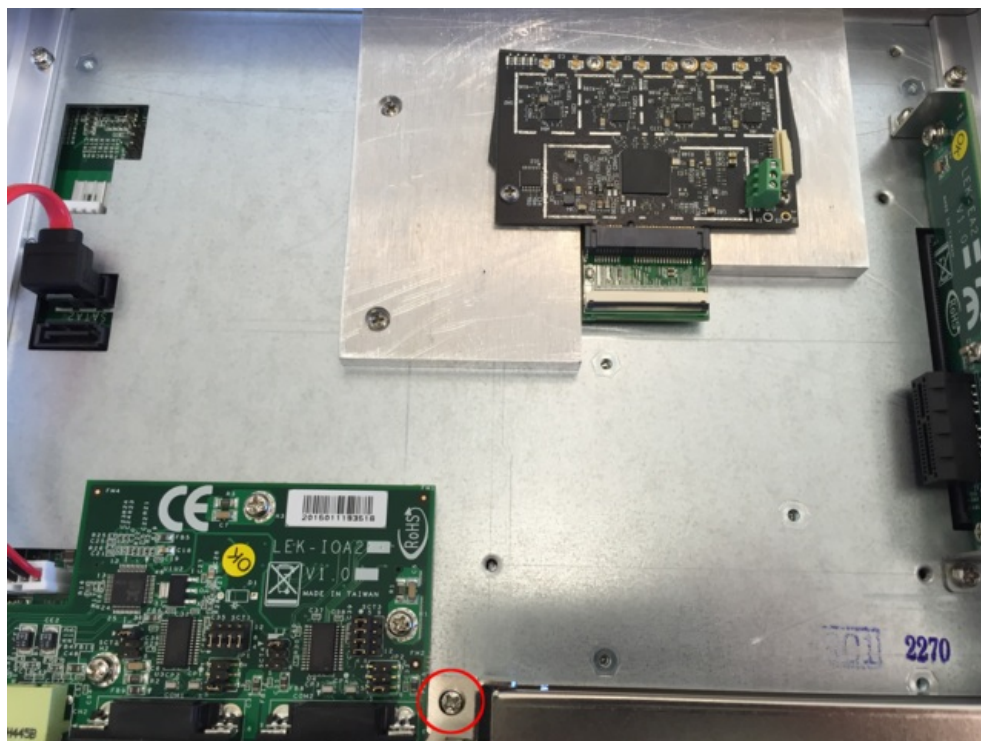
Replace 4 screws holding the NIC to the heatsink.

DO NOT OVERTIGHTEN or you may warp or crack the NIC.

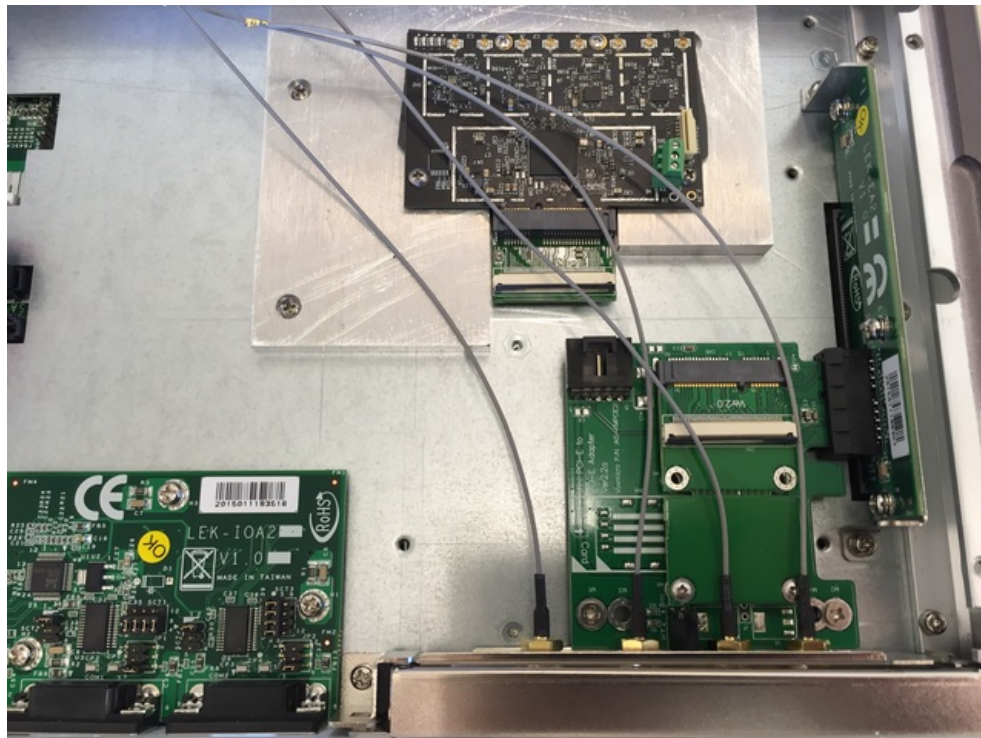


4. Install mini-PCI-E adapter

Remove the screw for the retention clasp.

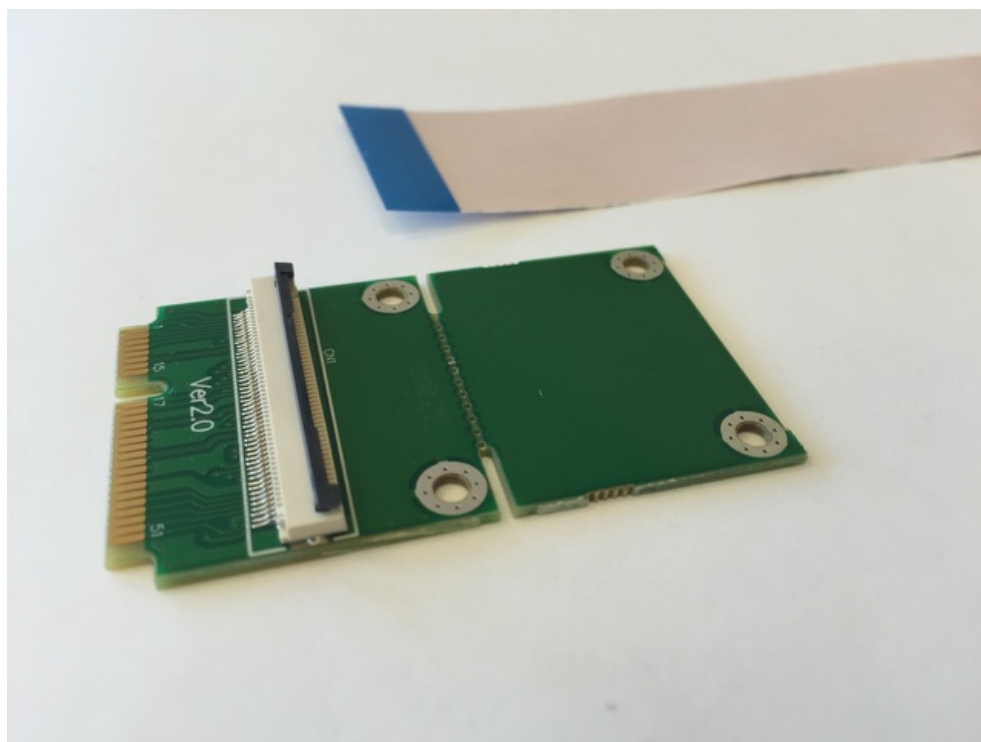


Insert the mini-PCI-E adapter and replace the retention clasp.

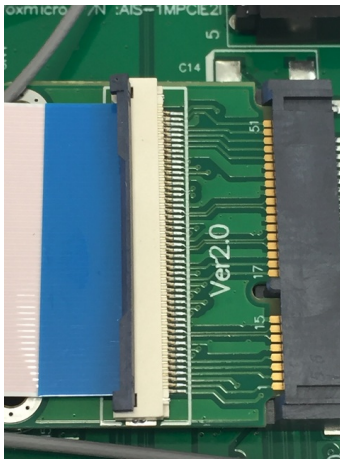


5. **Attach PCI-E ribbon cable**

Before inserting the ribbon cable, verify that the black cable clasp is in the up and open position.



The blue-tip side of the ribbon cable is facing up, insert the cable then close the black cable clasp.

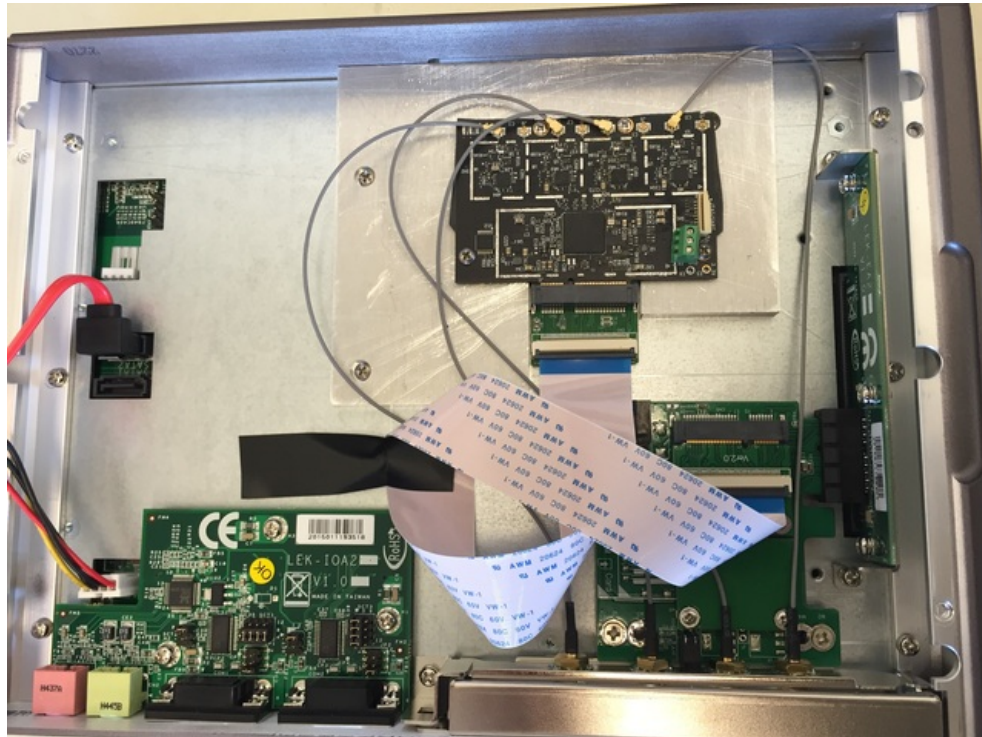


Open position



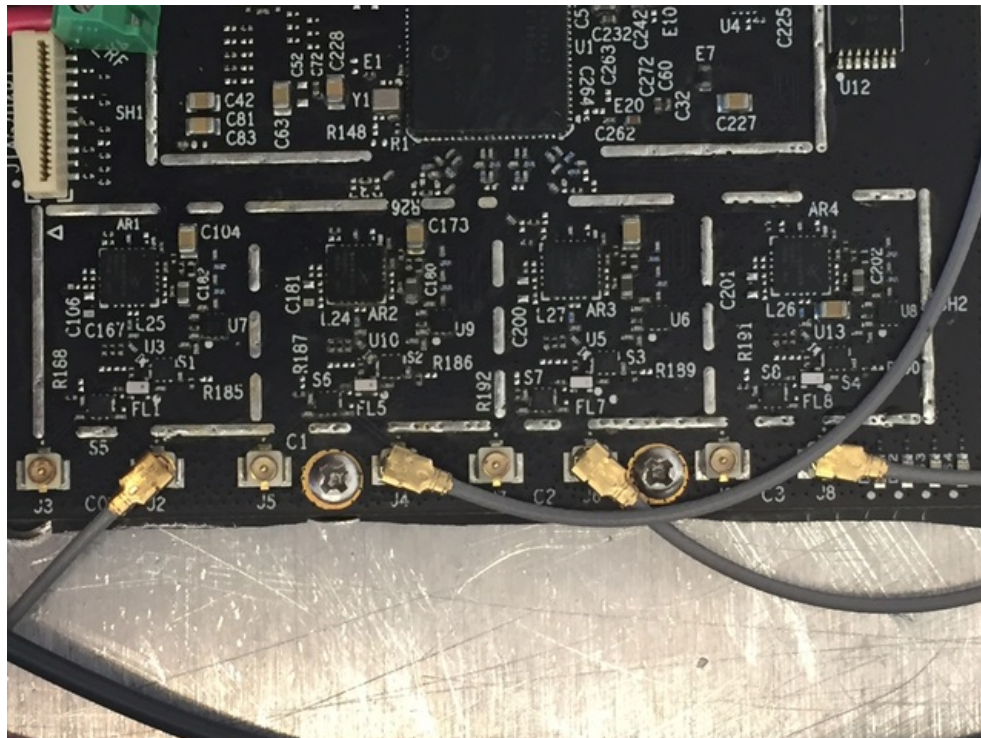
Closed position

After connecting to the mini-PCI-E adapter side, gently half-twist the ribbon cable then attach to the ribbon cable adapter on the heatsink side. The ribbon cable can be gently taped down so it does not get crimped when closing the chassis case.



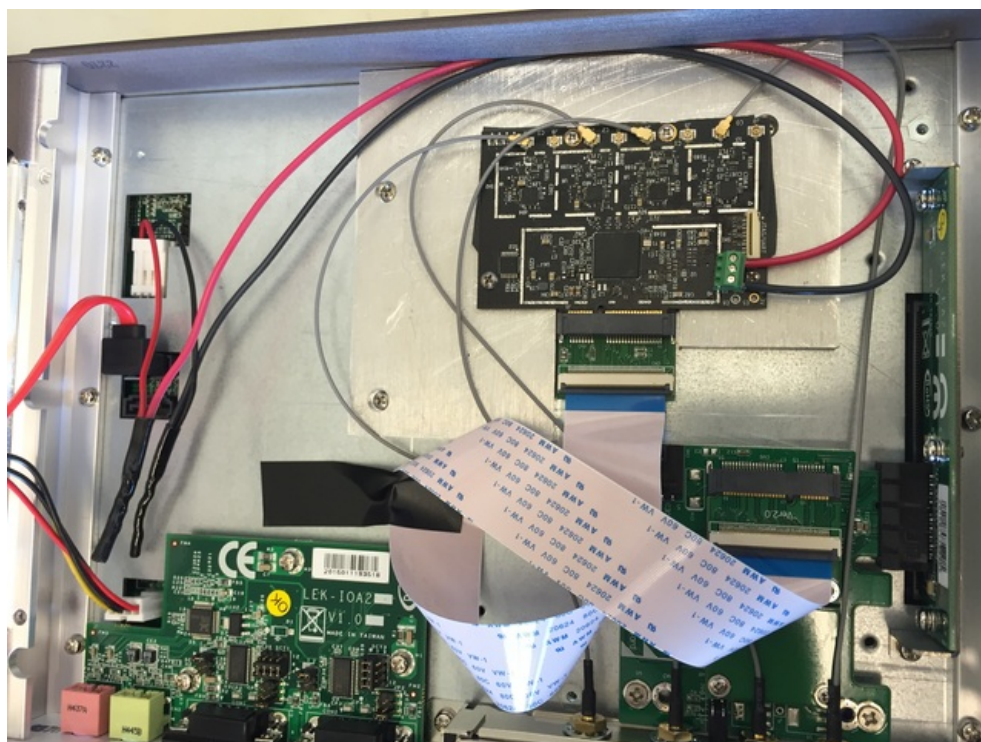
6. Attach antenna pigtail cables

The antenna pigtail cables should attach to the lower number connectors: J2, J4, J6 and J8. The newer QCA9984 NICs have only 4 connectors, just use all four for it.

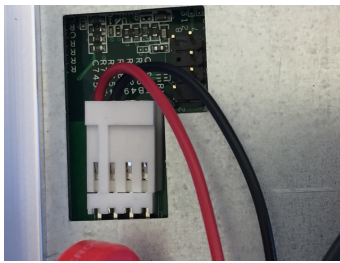


7. Attach 5v power supply cable

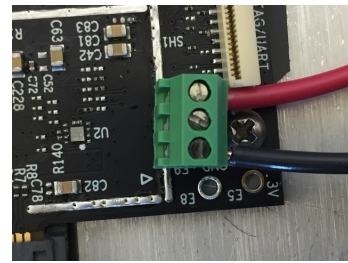
Connect the power cable to the 5v power supply using the keyed header, then connect the wire leads to the open terminals on the NIC side. Tighten the terminals with a small flathead screwdriver. For the newer cards, there may be a 4-pin connector header instead of the screw terminals. In that case, use the included 4-pin header cable. **The included 4-pin cable will have a different cable configuration from normal off-the-shelf 4-pin header cables, so make sure you use the included cable.**



Close up view of the +5v (RED) and ground (BLACK) wire connections.



5v power supply



NIC wire terminal

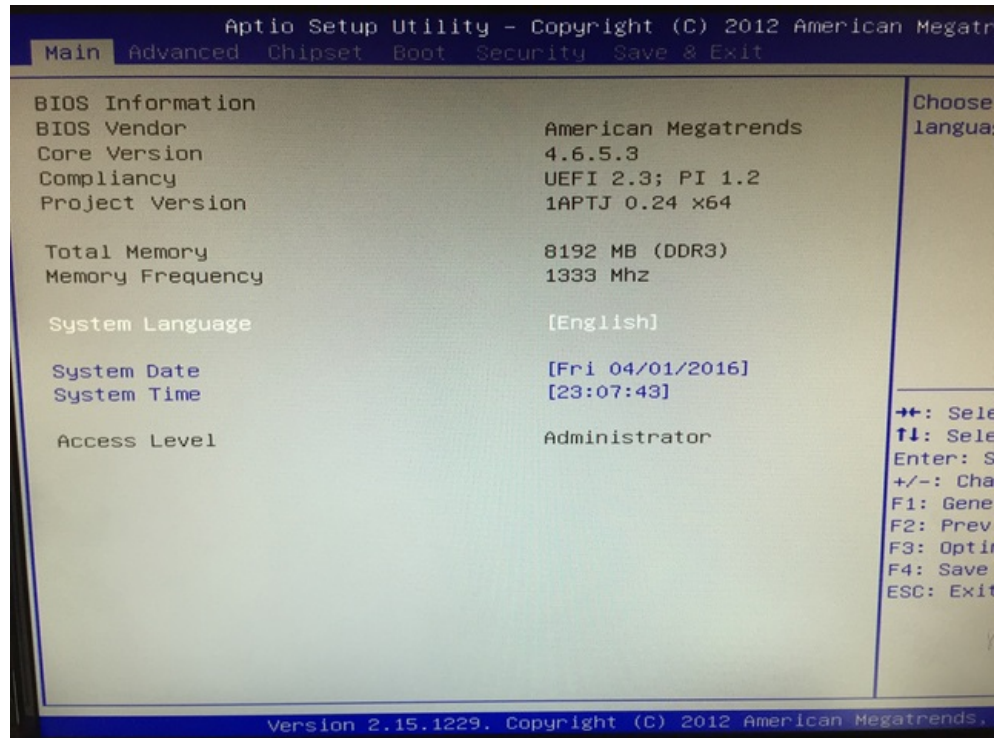
Close the chassis case and replace the 4 rubber feet on the bottom of the case.

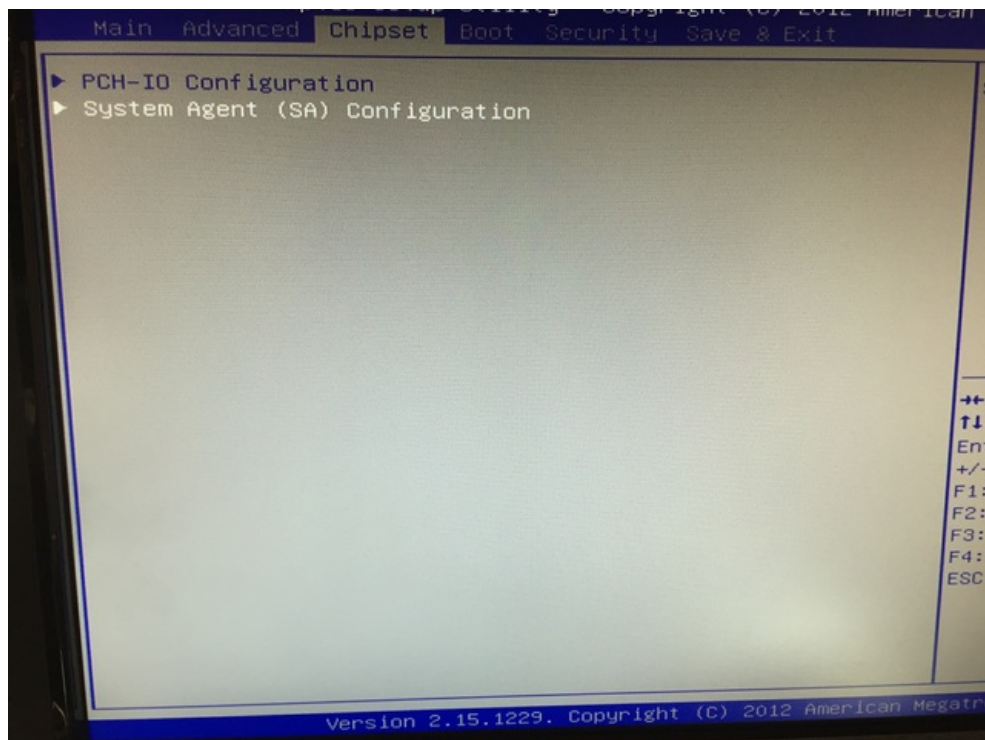
8. **Enable VT-d in BIOS**

At power up, hit the Delete key to enter BIOS.

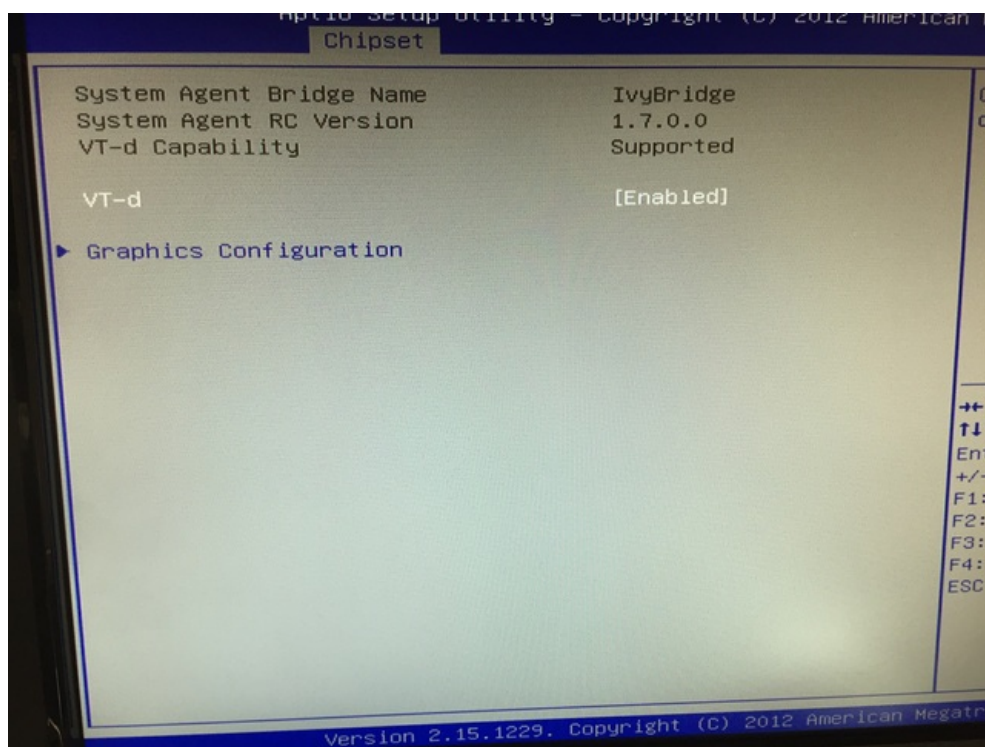
In the CT523 system BIOS, the VT-d option is generally located under:

Chipset - System Agent Configuration





Set VT-d to **Enabled**, then save changes and reboot.



9. Install LANforge 5.3.4 or higher

The best way to install the LANforge software and dependencies is via the lf_kinstall scripted installer.

```
perl <(curl -s http://www.candelatech.com/lf_kinstall.txt) --do_all_ct --kver 4.4.6+ --lfver 5.3.4
```

or:

```
perl <(curl -s http://www.candelatech.com/lf_kinstall.txt) --do_all_ct --kver 4.7.10+ --lfver 5.3.5
```

For more information, see the [LANforge Server Install Guide](#)

Once the software is up to date, add your new NIC's MAC address to the 70-phyname.rules file, and add appropriate wlanX entry to the 70-persistent-net.rules, then reboot the system.

/etc/udev/rules.d/70-phyname.rules

```
ACTION!="add", GOTO="phyname_end"
SUBSYSTEM!="ieee80211", GOTO="phyname_end"

# read MAC address
ENV{MATCHADDR}="$attr{macaddress}"

ENV{MATCHADDR}=="04:f0:21:0f:3b:ea", RUN+="/sbin/iw %k set name wiphy0"
ENV{MATCHADDR}=="04:f0:21:0f:3c:e6", RUN+="/sbin/iw %k set name wiphy1"
ENV{MATCHADDR}=="04:f0:21:1a:fe:5a", RUN+="/sbin/iw %k set name wiphy2"

LABEL="phyname_end"
```

10. Enable 10.4 NIC firmware

Bring up the LANforgeGUI and go to the Port Mgr tab then modify the new parent device to enable the 10.4 firmware. Here the new device is wiphy2. LANforge 5.3.5 and higher will look slightly different, but the general procedure is the same.

A new WLE1216V5-20 4x4 NIC with smaller form-factor was recently released. This one requires a special board file, and currently we know of no way to tell the difference between WLE1216V5-20 and WLE1216V5-23 in software. So, if you have the WLE1216V5-20 NIC you must manually create a config file that looks like this. The 'wiphy1' below specifies the wifi radio device name:

```
# cat /home/lanforge/fwcfg-bname.wiphy1
WLE1216V5-2-board.bin
```

Select the Firmware tab, then select

10.4 CT Firmware Defaults (4x4 wave 2).

wiphy2 (ct523-3ac-f19) Configure Settings

Port Status Information
Current: LINK-DOWN NONE
Driver Info: Port Type: WIFI-Radio Driver: ath10k() Bus:

Port Configurables

Standard Configuration RF Patterns **Firmware**

Configure Radio Firmware Settings

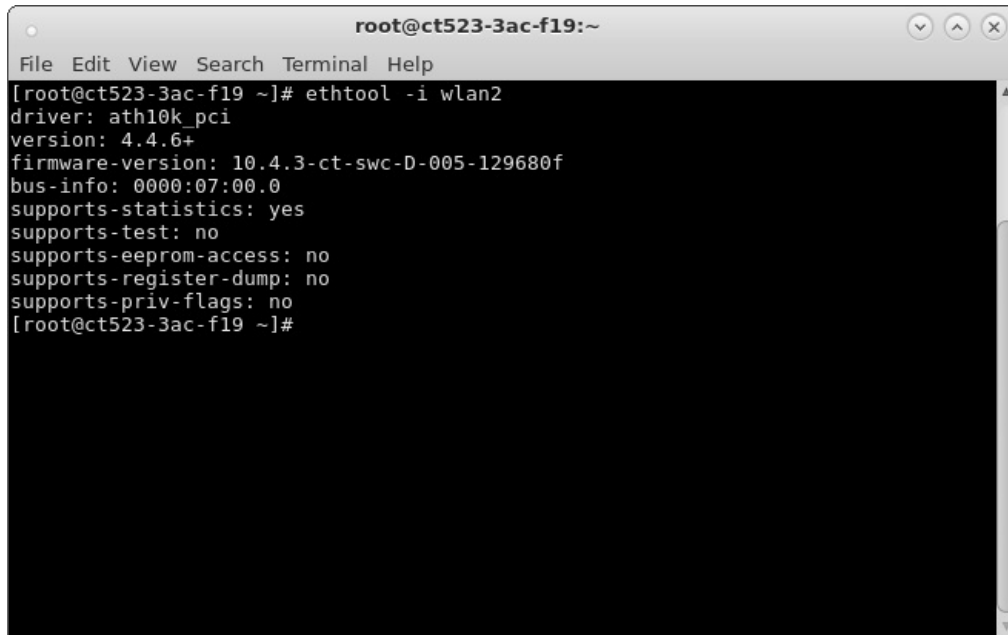
10.1 CT Firmware Defaults (3x3 wave1)
10.2 CT Firmware Defaults (3x3 wave1)
10.4 CT Firmware Defaults (4x4 wave2)

☒ Customize Firmware ☒ Software Decrypt

Firmware Image: firmware-5.bin
Firmware Version: 5
Virtual Devices: 36 (36)
Stations Limit: 72 (72)
Peers Limit: 72 (72)
Active Peers Limit: 72 (72)
Rate-Ctrl Cache Objects: 10
TX Descriptors: 1024 (1,024)
AST Hash Skid Limit: 72 (72)
TIDs Limit: 144 (144)

Print View Details Logs Probe Sync Apply OK Cancel

Select OK, reboot the system then verify that the new firmware is in use.

A terminal window titled 'root@ct523-3ac-f19:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the command '[root@ct523-3ac-f19 ~]# ethtool -i wlan2' and its output: 'driver: ath10k_pci', 'version: 4.4.6+', 'firmware-version: 10.4.3-ct-swc-D-005-129680f', 'bus-info: 0000:07:00.0', 'supports-statistics: yes', 'supports-test: no', 'supports-eprom-access: no', 'supports-register-dump: no', 'supports-priv-flags: no'. The prompt '[root@ct523-3ac-f19 ~]#' is shown at the end.

```
root@ct523-3ac-f19:~  
File Edit View Search Terminal Help  
[root@ct523-3ac-f19 ~]# ethtool -i wlan2  
driver: ath10k_pci  
version: 4.4.6+  
firmware-version: 10.4.3-ct-swc-D-005-129680f  
bus-info: 0000:07:00.0  
supports-statistics: yes  
supports-test: no  
supports-eprom-access: no  
supports-register-dump: no  
supports-priv-flags: no  
[root@ct523-3ac-f19 ~]#
```