RF Power Issues

Contents

Purpose

I was interested to see what the RF power levels were in my house generated by the various electronic equipment. This was partly curiosity, partly concern for health issues, and partly security.

Reducing the field strength requires hackers to be closer to my house to intercept signals and they can't do it from a car out in the street if I turn the power output down low enough.

RF Power Issues

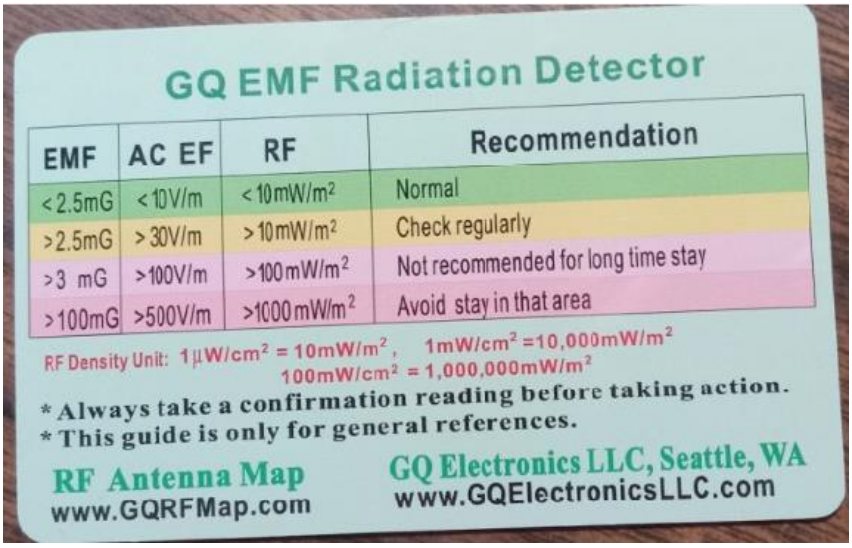
Equipment Needed

I purchased a field strength meter from Amazon here: [GQ EMF-390 Multi-Field Electromagnetic Radiation Meter](). This had many good reviews from people whose profession was EMI research so I decided to get it. It was quite easy to get it setup and start using it, this assumes you know what a spectrum analyzer is to start with of course.

Of course, there are many other equally good Radiation Meters out there as well that will do just as good a job as this one.

Safety Limits

The following are generally accepted levels of radiation used for determining if a situation is dangerous or not.



RF Power Issues

WiFi Analysis

I assumed that the WiFi signal would be the strongest RF signal in my house so I started with that.

As you can see in the picture below, the Router/WiFi station is positioned on the top of my book shelf. I positioned the Radiation Meter on the chair arm below. This should give a pretty good reading of the maximum signal strength because it is almost as close as you can get to the Router/WiFi station. Since I often sit and read in this chair, I was wondering what sort of radiation dose I was receiving.

RF Power Issues

Radiation Level Reduction

As you can see in the picture below to the left, the chair area was being subjected to 42-90mW/m2 radiation. The display shows 42mW/m2, but it fluctuated up and down to a maximum of about 90mW/m2 over time.

You can also see in the display that this in the "High" range of radiation. 100mW/m2 is the point where it starts to become dangerous, and 1000mW/m2 is definitely hazardous. So, sitting in this chair is borderline dangerous over long periods of time.

I then re-configured my Router/WiFi to reduce the signal strength from 100% to 40% (see following section) and you can see the results in the picture above to the right. Now the radiation level has dropped to the 5-8mW/m2 range. This is in the "Normal" range (0-10mW/m2) and should pose little to no health risks even over long periods of time.

I measured the field strength using my phone and got good reception (4-5 bars of signal) all over my house. Only when I went out in the yard did the signal drop to 3-4 bars.

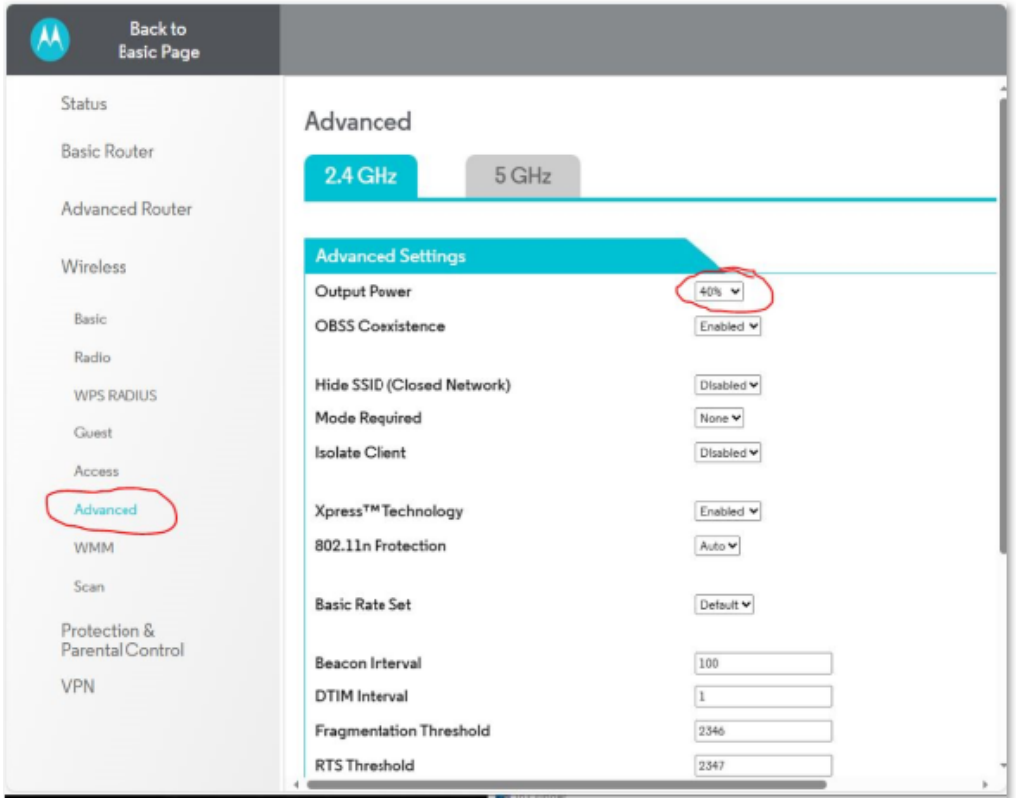
So, all of my WiFi devices continued to work fine and I reduced the health risk of radiation exposure which is a win-win situation.

UPDATE: at 40% power I did notice intermittent video blur while watching streamed video (probably due to increased retries.) I also had a strange situation where WiFi devices would connect to WiFi but without internet – even though hard-wired devices could still access the internet. I had to power cycle my cable modem to resolve this.

RF Power Issues

How to change WiFi Power Levels

All WiFi setups are a little different, but yours should have something similar to mine. You need to login to your WiFi device and go into the configuration menus and find the WiFi power setting – see below for an example.



You may have to play around with your setting until you find the lowest value that will still work with your WiFi devices. This is because everyone's house is different (from an RF standpoint) and the distance from your WiFi station to the farthest device will probably be different from mine.

Remember also that you will need to adjust this on both WiFi bands (2.4 and 5GHz) to gain the health and security advantages. It's not much good to reduce the power on one transmitter and still have the other transmitter running at full blast.

RF Power Issues

Issues I Ran Into

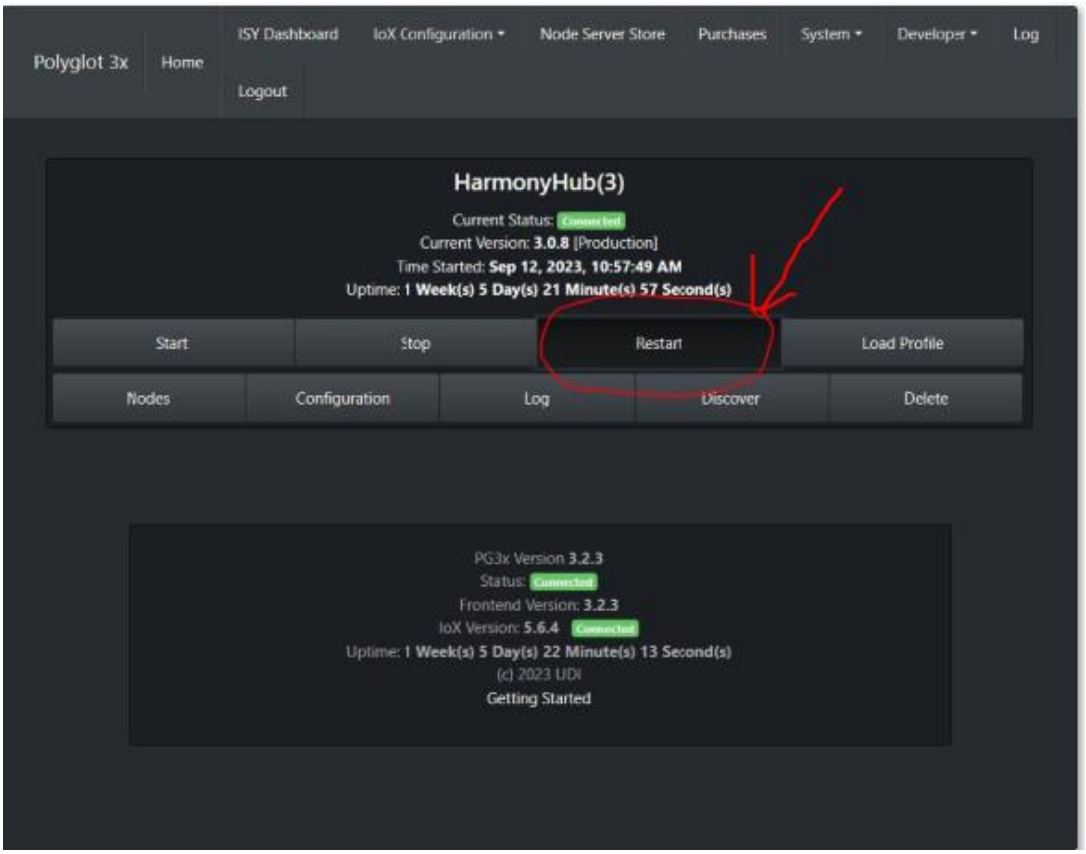
This is the type of issue you run into if you have a complex network setup. After reducing my WiFi power output, I found that I could no longer control my entertainment center using the Harmony Node in my home controller.

Surprisingly, it didn't even start working again when I raised the power level back up to 100%!

After tracking this down I realized that the node had lost WiFi contact with the Harmony Entertainment controller. This had nothing to do with the WiFi network which was correctly detecting the Harmony controller and assigning it an IP address.

The problem was that the Harmony Node running in my home controller wasn't "smart enough" to re-establish the TCP/IP connection with the Harmony Entertainment controller. This really had nothing to do with changing the power level (other than this disrupted the connection) and the same issue would have happened if I had restarted my Router/WiFi unit for any other reason.

The solution was to go into my home controller and "Restart" the Node so that it would re-establish connection with the Harmony Entertainment controller as shown below.



RF Power Issues

Other Radiation Levels in my House

Using the same methodology, I measured various other appliances around my house to determine the radiation emitted. You can see the results below. When not specified, the measurement was taken about one foot away.

Device	mW/m2 Radiation	Danger Level
Microwave Oven	1064-1140	Dangerous
Cell Phone, on call (next to ear)	150-200 avg, 635 peak	Not Recommended
Cell Phone, on call (1-2' away) w/earphone	5-15	OK
Cell Phone, not on call (next to ear)	0.001-2.911	OK
PC	0.001-2.50	OK
Entertainment Center	0.002-0.016	OK
Home Controller	0.007-7.045	OK

As you can see standing next to your microwave for long periods of time while it is on, is dangerous.

Also, talking on your phone – with the phone to your ear – is not a good idea for long periods of time. You are much better putting your phone a few feet away from you (not in your pocket) and using a Bluetooth headset, then the radiation is perfectly acceptable for long periods of time.

Of course, these numbers are approximate, and your phone, microwave, etc. may put out different amounts of radiation. But this is a good guideline to start with.