

Radiation Measurement of WiFi, Mobile Telephone and Home Microwave Oven

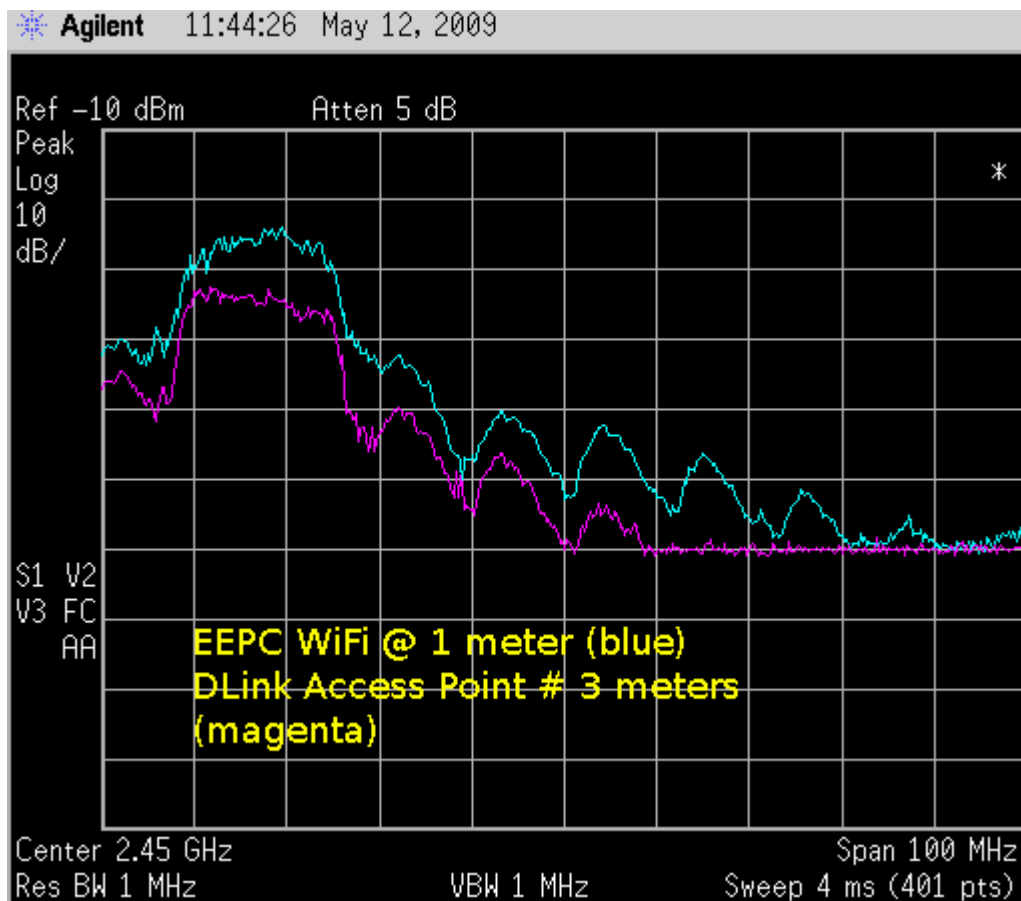
This document records three field strength measurements performed using an Agilent ESA spectrum analyzer and dipole antenna in the 2.4 GHz and 1.9 GHz spectra.

The first measurement is that of an active and busy 2.4 GHz WiFi channel being used to transfer data to a netbook laptop computer by way of a Dlink access point. The top measurement (blue) is with the spectrum analyzer sense antenna located approximately 1 meter from the eeePC netbook which is receiving a YouTube video about the dangers of cell site and WiFi radiation.

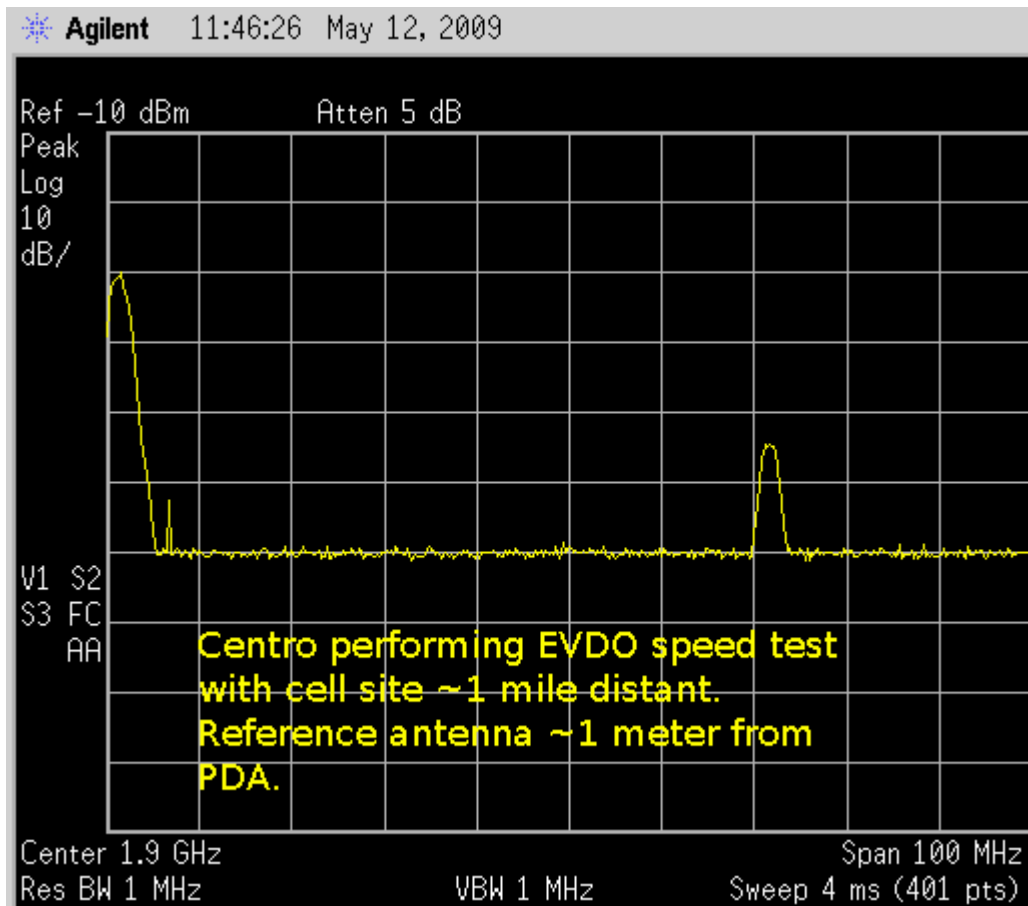
(<http://video.google.com/videoplay?docid=1754102982255927281&ei=nLEJSruIE6q4qAPOopy8CQ&q=BBC+Panorama+-+WiFi%3A+A+Warning+Signal+&hl=en>)

The lower trace (magenta) shows the same measurement but with the netbook removed to another room so that the signal is predominantly that of the access point located in a closet about 3 meters away from spectrum analyzer sense antenna.

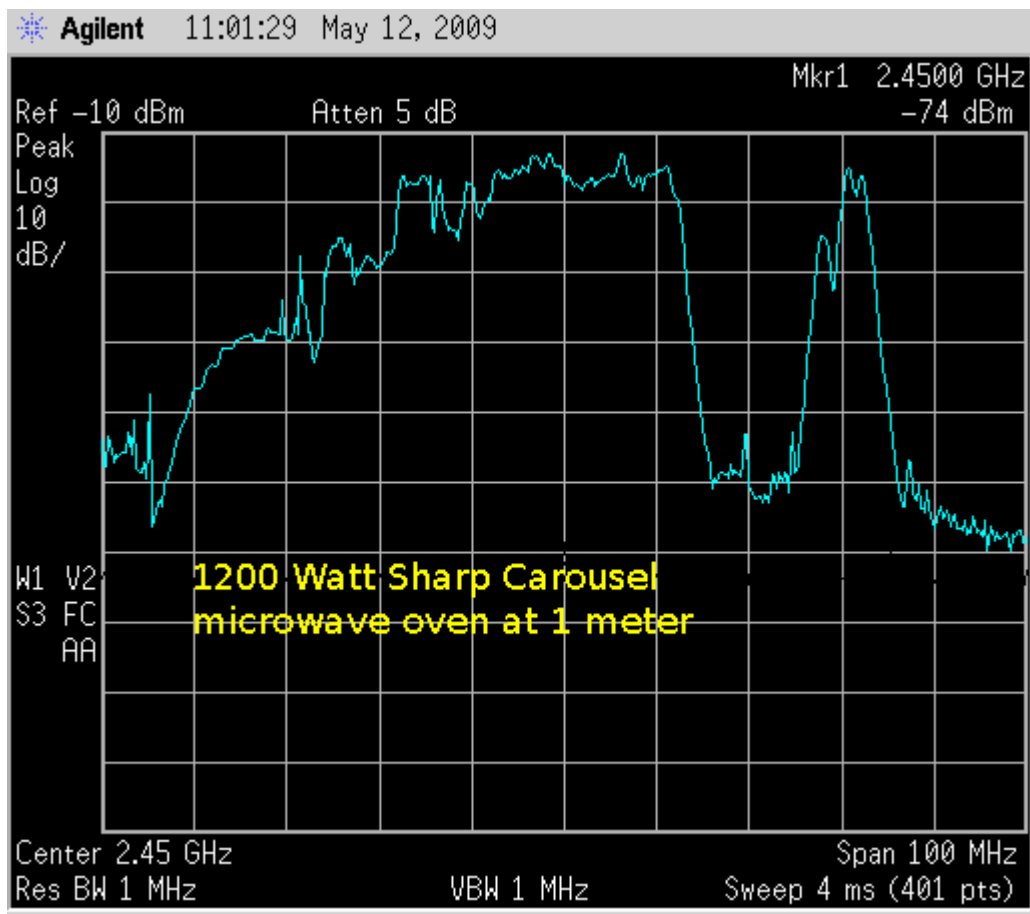
The approximately 10 dB difference in signal strength, ten times different received power levels, is consistent with similar transmit powers from the two WiFi devices and inverse-square free space loss.



The next measurement is of a Centro PDA operating on the Sprint EVDO 3G network. The spectrum is measured while data for a speed test is being transferred to and from the PDA. The lower signal near the left edge is that of the PDA transmitter (uplink) and the upper signal is that of the cell site which is approximately 1 mile distant. The recorded level is the maximum and represents the total power received from the site which is approximately 9 dB greater than the pilot power that would be reported by the RSSI indicator within the PDA.



The final measurement is of a 1200 watt Sharp Carousel microwave oven. The sense antenna is located next to the spectrum analyzer on a kitchen counter very near the location most users occupy while waiting for food to heat. As for previous measurements, the indication is of maximum power vs. frequency.



All three measurements use the same equipment and have the same scale and reference positions. Thus, the top of the display is -10 dBm or .0001 watts (equivalently, 100 micro-watts or .1 milliwatts) Each vertical division is 10 dB and represents a factor of ten difference in power. Thus the bottom of the screen is -110 dBm which is also the approximate thermal noise floor (KTB) for matter at room temperature.

With a measured difference of $(-15 - -25) = 10$ dB the microwave oven is seen to deliver 10 times the power of the WiFi laptop, at the same distance. The WiFi access point is approximately 20 dB less, or one hundredth the power of the oven while the PCS PDA is between the two at about 15 dB lower or one thirtieth the power of the oven.

The oven is not new but by every measurement and indication is operating well within specifications. Since the internal power is 1200 watts, about +61 dBm, the shielding of the oven is producing about a four million to one decrease in signal, compared to the inside of the oven.

n6gn
May 12, 2009