

Crossing the Digital Divide (v90)

“FUD”

By Joseph Feigon
For the Observer

There are a staggering number of articles on the Internet trumpeting the dangers of “Wi-Fi radiation” and how risky it is to your health. Don’t worry: it’s a bunch of nonsense.

If you don’t want to read a single sentence further, that’s fine, we’ll spoil the whole article for you: Wi-Fi poses absolutely no threat to anyone’s health. If you’re curious as to why (and perhaps so you can explain things to your overly anxious friends) we’re happy to outline exactly what’s going on.

This issue of Crossing the Digital Divide is the work of Jason Fitzpatrick. <http://www.howtogeek.com/234817/dont-worry-wi-fi-isnt-dangerous/>

Scare Tactics Are Click Bait

You’ll find no shortage of articles on the dangers of just about anything if you look around the Internet. Articles about how dangerous modern medicines are, how dangerous cell phones are, how dangerous cooking your food in a microwave is, and yes, how dangerous Wi-Fi is. People claim that Wi-Fi routers keep them awake at night, cause cancer, cause hyperactivity in children, and all manner of unsupported and nonsensical claims.

Yet despite the absolute lack of evidence for any of these claims, people still keep clicking on the articles, posting them to Facebook, sharing them with their friends, and *worst of all* believing that Wi-Fi is some silent killer in their midst quietly nuking their bodies and steering them towards an inevitable bout with cancer.

These articles and websites don’t exist because the threat is real, however. They exist because they are a vehicle for turning people’s fear into money. The more people share nonsense articles about the dangers of Wi-Fi (or other harmless modern things) the more people click on them, the more ad-revenue is generated, and the more motivation the people peddling these rubbish articles have to keep creating and promoting them.

We actually debated including some links to some of the worst offenders just to show you how outlandish (and unscientific) the claims they make are, but we couldn’t stomach giving them even a penny of ad revenue. If you want to see how bad things are you can search for “Wi-Fi dangers” on Google where, it becomes clear, the page rank algorithm doesn’t always reward pages with the most scientific merit.

We can’t stop people from misleading others for profit, but we can respond to their nonsense. We’ve received more than a few letters here at How-To Geek from concerned readers asking if they should turn off their wireless equipment when not in

use, or get rid of it altogether. So we've decided to add a reasonable voice to the conversation so, hopefully, people will find this and breathe a much deserved sigh of relief.

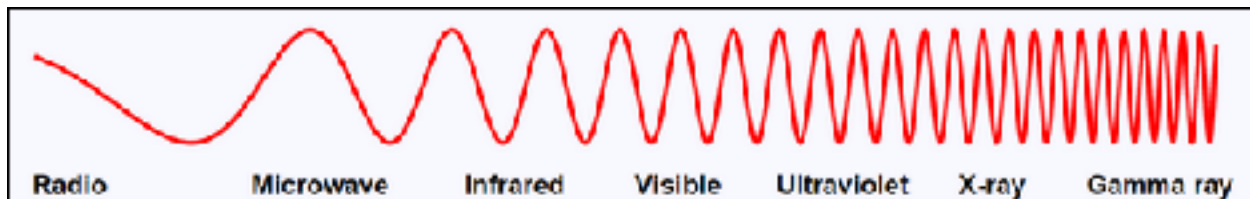
Not All Radiation Is Equal

To understand why Wi-Fi is not a danger to your health, you need to understand some fundamentals about radio communication and the radiation that makes it possible.

The word radiation is, to the lay person, a scary word. Radiation is the stuff that 1960s school children were taught to climb under their desks to avoid, and what prompted Cold-War-terrified Americans to build backyard bomb shelters. Radiation is the stuff that leads meltdowns at nuclear power plants to contaminate the ocean and make land uninhabitable for hundreds of years.

Radiation is also the thing that bathes the world in warm sunlight, and makes life on Earth possible. Radiation is also the reason we can turn on a radio and hear music without wires. Radiation is how we change the channels on our television (and for anyone getting their TV fix via over-the-air channels or satellite TV, how the programming gets delivered to their home in the first place).

The most critical concept when it comes to talking about radiation is the distinction between ionizing and non-ionizing radiation. Ionizing radiation is the dangerous stuff and includes x-ray radiation, gamma radiation, and some amount of ultra-violet light on the high end of the ultra-violet spectrum. The key element here is the wavelength of the radiation type.



Ionizing radiation gets its name because it has enough energy to excite electrons and knock them out of their orbit, or ionize, them. Extensive exposure to this kind of radiation is highly detrimental to your health, and even low but persistent exposure over time can significantly increase your risk of cancer as exposure can mutate your cells. Even when used for beneficial purposes (like using an x-ray machine to diagnose a patient), the exposure is carefully controlled by the use of lead vests, shielding material, and so on so that the patient and the operator of the machine are given as minimal exposure as necessary. If you're worried about radiation, this is the radiation you should be worried about. (And even then you shouldn't be *that* worried as the amount of radiation you're exposed to during routine medical procedures is, over the

course of your lifetime, less than the amount of radiation you're exposed to over the same period on the aircraft flights you take for business and vacations.)

On the opposite side of things, we have non-ionizing radiation. This radiation does not have enough energy to ionize atoms, and includes everything else on the radiation spectrum including infrared radiation, visible light, and radio waves, including everything from the kind of low-energy radio waves we use for walkie-talkies to higher energy radio waves like those in the microwave portion of the spectrum.

Want an official word on the matter? The World Health Organization, which tends to err on the side of caution before outright dismissing something as toxic, carcinogenic, or otherwise harmful, is very clear that there is no health risk from radio-frequency communication devices. The briefing is on the web @ <http://www.who.int/peh-emf/publications/facts/fs304/en/> and is a great read that highlights how low the risk is and how even people in Wi-Fi dense locations like schools and hospitals are exposed to radio-frequency radiation at thousands of times lower than international safety standards designed to protect individuals working in related industries).

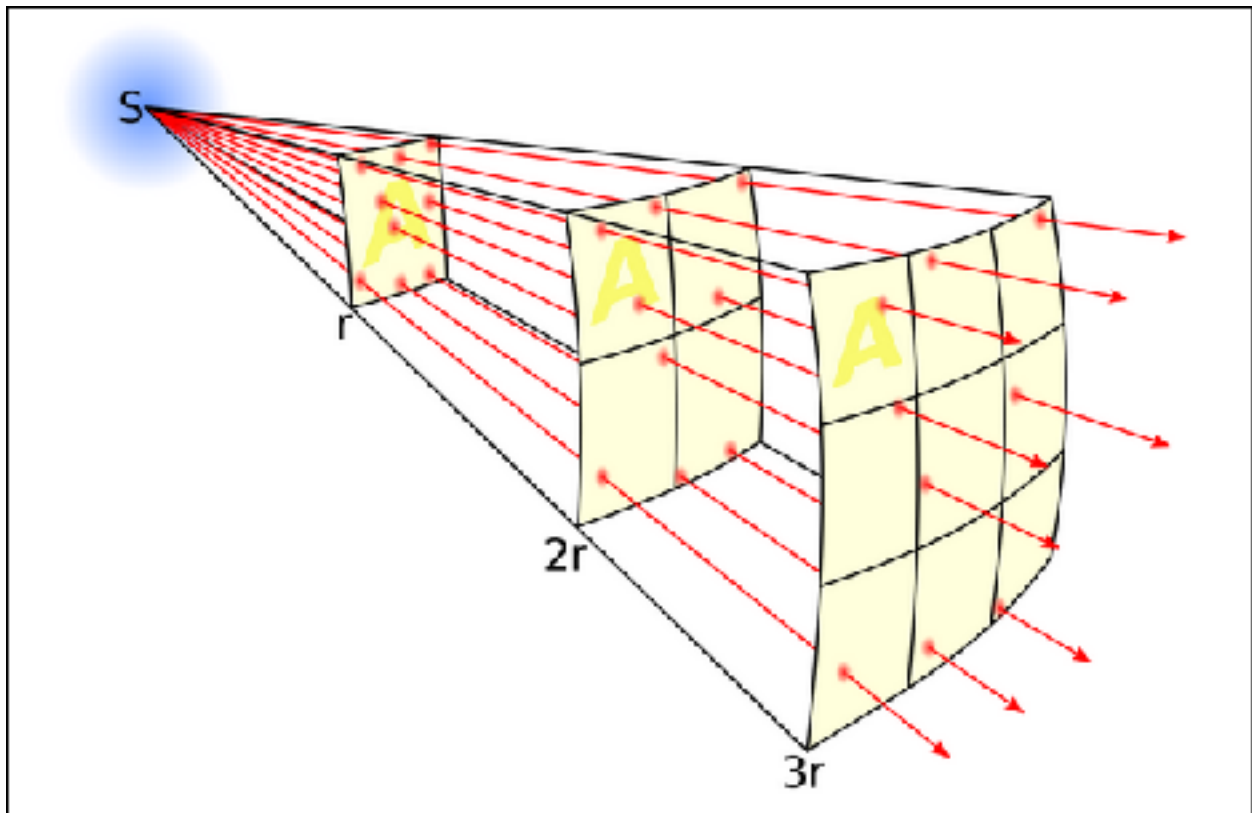
In summary: Long wavelengths? No worries. Enjoy your radio station, Wi-Fi hotspot, and delicious microwaved Hot Pockets. Short wavelengths? You're either going to turn into a super hero or (maybe) die of cancer.

Distance and Power Matter

Reading the last paragraph of the previous section you might be saying "Ah hah! Microwaves! Microwaves are bad, they make things very hot and they could burn you!" That's absolutely true. You would not want to build a human size microwave oven and stand inside it. Nor would you particularly enjoy being the target of the crowd-dispersing microwave cannons built and deployed by the U.S. military.

In those cases, however, there are two important things to note. The person exposed to the non-ionizing microwave radiation would be exposed to a very high power dose at a very close range. The magnetron in your average consumer microwave produces about 700 watts of microwave energy, and that microwave discharge is safely contained within the body of the microwave thanks to proper shielding. Even if the microwave was malfunctioning and the shielding was beginning to fail, you wouldn't even feel anything standing in the same room as the device.

By comparison, even a very powerful high-end Wi-Fi router only produces around 1 watt of microwave energy and, unlike the magnetron in a microwave oven, a Wi-Fi router radiates that minuscule 1 watt of power in a bubble-like-cloud around the router. In other words, if you wanted to heat up even a milliliter of water above room temperature using this energy, you'd be waiting...well, forever.



Not only are these devices of radically different operating powers, but they are equally at the mercy of the Inverse-square law. The Inverse-square law is a physical law which states that the quantity or intensity of linear-wave radiation is directly inverse to the distance the observing/affected body is from the source of the radiation. In the illustration above, you can see how the further the given area (A) is from the source of the radiation (S), the less exposure it receives. This law applies to radio, microwaves, visible light, and all manner of waves we experience around us in the natural world.

Because of this physical law, even *if* holding a Wi-Fi router *directly against your forehead* was very dangerous (and, we assure you, it is not) working in your home office 45 feet away from the Wi-Fi router would not be dangerous simply because the microwave radiation of the already minuscule 1 watt Wi-Fi router would have radically decreased in intensity. When you factor in that the Wi-Fi radiation is already harmless, you see that there is no situation in which the Wi-Fi signal from your router, your laptop, your media center, or any other Wi-Fi device in your home could possibly hurt you.

Wi-Fi certainly isn't going to do you in, but something else you forgot to worry about while you were worrying about your Wi-Fi router might: put that worry to good use and make sure there are fresh batteries in your smoke detectors, that you're planning on

getting a yearly physical this year, and you floss before bed (you know, those things you've been putting off that might actually, sooner or later, harm you).

Image credits: Mad House Photography, NASA, Borb.

Control those things you can, and keep the surprises to a minimum!