

Wi-Fi or the Wild West

A Brief History of technology and computers to the present day.

Philo T. Farnsworth, the TV inventor, was upset with what Hollywood and others had done with his invention. It was not until 1969, when he witnessed the moon landing from his bed, did he tell his wife, "This made it worth it."

Today, the smartphone in your pocket has far more computing power than NASA had during the "First Big Step for Mankind."

When computers showed up in the ordinary household, it was around the same time Joshua was planning the end of humanity using a fictional computer known as the Whopper in the movie *Wargames*.

Wargames featured an Altair 8800 computer—which came out in 1975 and was built around a 2 MHz Intel processor. The stage prop computer, somewhat fictionalized to enhance the movie, was in fact a computer a rich kid might own.

Ray Kurzweil coined the phrase *Law of Accelerating Returns*. Simply put, feedback from trial and error allows technology to progress at a faster rate. Philosophically perhaps, L.O.A.R. could allow technology to outstrip man's humanity. Could Hal really not do that, Dave?

L.O.A.R. played out in the world of data processing. As the geeks spent their lives pounding out code, different languages came about to take advantage of hardware that was developing. With new hardware and new ideas for programs, we relegated the typewriter to the annals of history right next to the quill pen and stone tablets.

As different storage techniques developed from punch cards to magnetic cores, we ended up with cassette tape, and soon after, floppy disk. A 10 megabyte hard drive was a mere \$3992.00 in the 80's. Today you can purchase a Terabyte SSD (solid state drive) for less than \$100.

When files became transferrable, we invented novel ways of transporting them. With success, there seem to be limitations that come hand in hand. Disks held to file cabinets with a magnet were one of the first hard lessons for non-technical people to learn. Once exposed to a strong magnetic force, the media was forever destroyed.

At that time, computers were for geeks who spent hours creating code to have some dot-matrix printer spit out one line of text.

You could always spot a geek in a crowd. Not just from the tape on their glasses, pocket protectors, or even their weight problem from the sedentary lifestyle and eating too much pizza. It was more their aversion to intense light that gave them away. Much like the *Morlocks* in HG Wells *Time Machine*, you could be certain when a geek came out from the computer center. If they saw their shadow, it was painful. If they were shaved or nicely dressed, they were forced to leave their lair to report their progress, or look for more money, or perhaps beg forgiveness for missing scheduled meetings and or work.

Many of us, including yours truly, saw many sunrises. Not that we got up in time to see them, we just never went to bed. Fueled by caffeine and a desire to find the bug, or "undocumented feature," sleep was not a priority. Only when this mysterious ray of light crept in from behind the closed curtain, did we realize how badly we screwed up, as it was a workday. I'm convinced that energy drinks came about because of geeks. Sadly, just a little too late for me.

Computers stayed in the world of PC wizards, nerds, and geeks until Bill Gates discovered the graphical user interface on a massive computer Xerox created. That thing was colossal. It had a rudimentary form of email and a mouse and even a kind of browser.

When the GUI was married to the PC, we saw significant transformations in business—technology that was usable by someone other than a night-dwelling creature of bits and bytes, and Greg Shorthand and the \$100 letter went into the dustbin of history. To be fair, the Dictaphone was also part of this transitory process.

Before computers, the average cost of one business letter was \$100.00. From dictation to transcription, edits and retyping business letters was expensive. The purchasing power of \$100 in the mid-'70's would be about \$500 in 2020.

When the computer ended up on the executive's desk, the world changed. With the advent of the GUI, someone at Microsoft came up with an intuitive interface. Once you learned one application, you could navigate most of them.

Before the GUI, we had DOS (disk operating systems) based programs like Lotus and WordPerfect. These and many others took a backseat to Microsoft Office. The next leap was email. Wedding PC servers to mainframe computers via gateways allowed anyone in the company to send a note or rant to anyone else in the same company. More times than I can count, people in lower positions would accidentally send a message to everyone, instead of their intended audience.

While we were all amazed at what we could do with our PC's, businesses needed to tie them together. That's how a way to "wire" the entire office together with servers and cables came to be. About this time, someone created the Michael Angelo Virus.

Pre-Internet, some ne'er-do-well created a boot sector virus that activated on March 6, 1992, and rendered the hard drive of any computer affected unusable. As machines failed to boot in a campus of around 500 computers networked together by token-ring, we realized we were under attack.

Up until then nobody had dreamed of malevolence without some payback, and we'd never seen a virus before. We learned, and another cottage industry was born—McAfee antivirus software. Much like Apple products started in a garage, McAfee created many software programs in the wee hours of a home office.

When the Internet first appeared, it was a text-based, dial-in service. Those geeks among us still remember and long for Gopher, FTP, and VI. No, really, we don't.

Much like the PC, the Internet became graphically based. Companies like CompuServe, AOL, Prodigy, and EarthLink were a few—hence the www or World Wide Web.

Today, you have at your fingertips access to more information than you could ever want to know, equal amounts of misinformation, and a whole new world of threats, which we'll deal with next.

Computer technology ages quickly. Someone comes up with a better mousetrap before the current mousetrap hits the market.

Industrial espionage is a real thing and one of my specialties, including figuring out if it happened, how it happened, and how to stop it.

Q. Wi-Fi or Wired?

Wi-Fi works on basically two bands or groups of frequencies. When I say frequencies, I mean they're literally like radio transceivers. Sending streams of 1's and 0's, your device talks to a device known as a router which connects your device to the internet. The first Wi-Fi router worked at 2.4 GHz.

Q. Why 2.4 GHz?

With the advent of the microwave oven, the FCC quickly realized that 2.4 GHz was the new Wild West. They, in fact, could not do anything with it as early devices leaked RF radiation and worked at 2.4 GHz. You might remember signs on doors warning customers that there were microwave ovens in use. Pacemakers (medical defibrillators) malfunctioned if they were too close to strong RF.

Noise from microwaves also made this band unpredictable. Baby monitors, some phones, and other non-critical devices were put into this same band. To cover the manufacturer's butt, those devices had a label that read, *This device must accept any interference received, including interference that may cause an undesired operation.*

Early Wi-Fi routers were plopped right in the middle of the DMZ. Years later, the 5 GHz version showed up with its own unique advantages and disadvantages.

Within the 2.4 GHz band, 11 channels have been assigned, 20 MHz wide each.

If your devices are on a different channel than your neighbors' devices, even though they might seem to conflict with your own, they generally won't speak at the same time.

If your devices are on the same channel as your neighbors' devices, they will try to yell over the one interfering, slowing your—and probably their—internet experience down.

The first band, 2.4 GHz, will go through walls and floors with much less loss than 5 GHz. But why should you care?

Most internet packages today are gigabyte service. If you average less than 30 megabytes and are paying for gigabytes, it doesn't take a genius to see that you paid for a Ferrari and got a three-cylinder smart car.

Go to a site called FAST.com and check your speed. Walk room to room and see what you have. Netflix powers Fast.com. Buffering streaming services is one place speed matters.

Q: Why not use 5 GHz?

There are tradeoffs. 5 GHz does not share the same frequency as your microwave and many other devices, which is a plus. That band also has 24 non-overlapping channels at 20 MHz each, unlike the 11 overlapping 2.4 GHz channels.

Q: What is the downside to 5 GHz?

That band suffers in range. The frequency is attenuated by just about anything. If you sit between your laptop and the router, your body will attenuate the signal. Walls, floors, and so on inject loss or degradation of the signal both to and from the router and your device.

Outside the scope of this article, there is a technology called meshing where you use extenders and/or multiple routers to gain good signals throughout a large house or campus. A significant part of this plan is you can cover a large area with 5 G. The downside is more cost and more complexity.

One of the many complaints of W-Fi is adequate coverage in one part of the house and inadequate coverage in others. With that in mind, when you purchase your internet plan, consider having the installer put the router in the center of your home.

Q: What devices should use wireless and why?

Devices like tablets or phones or portable computers. You sacrifice a lot of speed when you're not wired. You also risk security as your signal could be "heard" by evil folks. Whether they are psychopaths, pure evil, or just jerks, just know they exist. And they have anything but your best interests at heart.

Once you get your new router, change the username and password from the defaults. Make a note of those changes, even if you have to tape them to the modem/router itself.

As we mentioned earlier, if you have interference from your neighbors' router, one option is to purchase a paint that has a nickel component to it. Ideally, you find which room or rooms of your home are closest to the offending signal and paint those walls. If I lived near high voltage power lines, or close to a radio tower, I might consider that paint anyway. But again, that's outside the scope of this article.

The downsides to the paint are that it also interferes with other radio signals like your cell phone and it's an expensive extreme measure. If you're interested, there's a brand by M.G. Chemicals that is much like a primer.

Q. Why does my internet die?

Assuming your internet only dies in your house and not the entire area, there are a few possible reasons.

Once you unplug it for 15 seconds and then plug it back in and your download continues, you stop thinking about it until the next time. Then your real problem never gets fixed.

Inside your router, no matter if it's an expensive router or an economy model from the cable company, there's a CPU, memory, and an operating system. And it needs to breathe. I know too many people who think routers are ugly and tuck them behind something out of the way. If they are hot, the odds are excellent that some of your problems are overheating.

The issue could also be poor location. Put them somewhere centrally located and even add a little height, perhaps on a bookshelf. Slightly off topic, but germane to the conversation, keep them away from where a human might spend a lot of time. Routers emit RF (radio frequency). There is no point in sitting too close to a constant source of electromagnetic radiation.

Q. What if you have several people all trying to use the Internet at the same time?

If the load on your router is significant, and you have that economy model, you might very well be overwhelming it. For example, you're working from home, using the Internet as your phone, and Voice is a priority while you're on a conference call. Your spouse is trying to download a new original Netflix series. And your kids—who are supposed to be homeschooling in their bedrooms—are sending tentacles out to dozens of servers to grab gigabytes of video game updates so they can get in on the game schedule set up by their friends.

Your conference call stutters and stops, Netflix continually buffers, and your kids are out of luck. And no one's happy.

If your router is of a high enough quality, you can set something called QoS or quality of service. Because several types of packets traverse the Internet, you can prioritize certain types of traffic inside your network

and set things like video game stuff to the bottom of the list. FYI, game updates are huge bandwidth hogs and should be run during off hours.

If your router has a USB port on its back, you can put a hard drive on it. This option will allow you to have shared files with your family in one central location.

Research choosing a router carefully. Once you think you understand which one you want in your price range, look for customer reviews. Look at sites like Amazon for verified purchases. Dismiss the one-offs and look for averages.

Your router also performs as a firewall. You can tell it what traffic to allow and what to deny.

Lastly, if possible, use your computer hooked to a wire. Most routers have what is known as a switch. There is a WAN port and a few Ethernet ports. Once the switch learns the wired device's mac address, it will send all traffic meant for that device to that device.

Gigabyte Ethernet and Internet are commonplace. Your computer will work much better tethered to a wire than over radio waves colliding into walls, microwave radiation, baby monitors, wireless phones, and the like.

Also note, fish tanks are a common source of router Wi-Fi issues. The heater element uses a crude thermostat where the switch is much like points on your old pre-1980 Buick. When the temperature gets cool enough, the contact mates with the other causing a spark to jump between them. This spark is an RF noise source that crosses much of the radio wave spectrum. Use an AM Radio, tune off a station and listen for static. A fish tank heater will make a definite loud burp that interferes with digital signals.

Q. What about public hot spots?

From the coffee shop to McDonald's, you can find free Internet. Why is this type of Internet more like the Wild West than your home or office?

Do you remember March 6, 1992? Yes, that 48 hours of no sleep will live in infamy. At least for us geeks.

Back to the virus. There are people out there who are loathsome creatures who need help. Some, like the creator of that first virus I spoke about, are probably evil geniuses. Others are looking for ways to exploit you.

In a free hotspot area, there are three ways they can mess with you. First, they will set up a fake hot spot on their laptop. Once you connect to them—and heaven forbid, try to do online banking—they have your username and password.

Second, some devices are sold as legitimate Wi-Fi cards that plug into a USB. Programs exist which allow this device to go into something known as "monitor mode." With the right tools, the bad guys can capture all the traffic in the area and then later see what information they got.

Thirdly there is something known as ARP spoofing. The evil geniuses are smart enough to figure this crap out and would rather sell your information on the dark web than get a real job.

Please don't use the public Internet for anything that requires any of your passwords. If you go to a website, make sure it says it's HTTPS, which means it's encrypted. Yes, those bad people can still download what you're doing, but it shows up as garbage to them.

I hope you found some useful information that helps you stay safe and gives you some ideas for taking advantage of Wi-Fi in your home.

About the Author

Scott Taylor has worked with computers since the 70s and is currently involved in forensic computing, business continuity, and disaster recovery. He's witnessed the industry's evolution from typewriters and secretaries to CEOs penning their own documents. A few highlights from Scott's career have been working with just about every kind of computer on the market, and meeting not only famous doctors and lawyers but business moguls like Steve Jobs.
