



# Are Wi-Fi Networks *Harmful* to Your Health?

*Probably Not, But Why Not Lower Radiation in Them Anyway?*

A GoNet Systems eBrief



**With almost every communication and computing function going wireless, consumers and device users are understandably concerned about the effects of all those radio waves surrounding us almost anywhere we go.**

There are no studies that definitively tell us whether these radio waves are harmful. And while there are anecdotal reports of individuals affected by heavy mobile phone use, no research has been able to authoritatively establish whether the "radiation" connected with wireless transmission of voice and data can negatively affect our health.

But as users keep their smartphones with them at all times, and spend large amounts of time in areas where cellular and Wi-Fi networks are in heavy use, they clearly are exposed to much greater amounts of radiation now than they were five or more years ago.

It is true that the evolution of mobile communications to a more



data-centric model – with texts and apps displacing voice calls as the primary use of mobile devices – has meant that people are less inclined to have their phone to their ear at all times. That means a reduction in very short range radiation exposure to their brains, an exposure that had been a traditional concern among health specialists.

## Are Wi-Fi Networks *Harmful* to Your Health?

Cellular networks have always been the greater issue, because of the proximity of the device to the user's head. Wi-Fi networks were of lesser concern because they were typically used for mobile and remote computing, with the connecting device a greater distance from the user's body.

### Wi-Fi Network Proliferation

However, that has changed with the proliferation of Wi-Fi networks, both public and private, and the rapid growth in the number of devices that connect via Wi-Fi networks. Many mobile phones used by consumers are now designed to connect first to an available Wi-Fi network – since that is the most cost-effective method of communication – and only connect to the cellular network if there is no Wi-Fi connectivity available.

So the fact remains that there are radio waves all around us, at almost all times, particularly in dense urban areas. While there may not be any clear proof that this has harmful health effects, most users and consumers would agree it would still be good to reduce the volume of this radiation wherever possible



This is especially true as more Wi-Fi networks are installed in schools. Even adults who might be completely unconcerned about Wi-Fi radiation and its effect on them will think twice when it comes to their children, especially younger children whose bodies are developing and who may be exposed to radio waves for the entire school day.

Again, there has never been proof of any real physical or neurological harm, but parents are concerned about their children, as they should be. The same conditions apply in any location where people – young and old – spend significant time, such as an airport terminal, concert hall, university lecture halls or gathering spots, even an outdoor park.

## Are Wi-Fi Networks *Harmful* to Your Health?

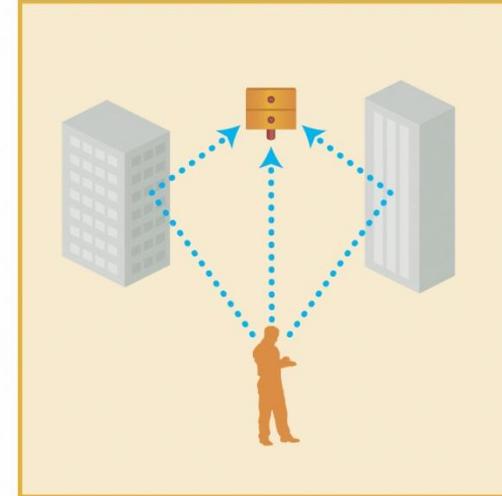
With such concerns in mind, this eBrief addresses how Wi-Fi networks can be effectively implemented, delivering all the connectivity benefits that users want but with less radiation.

### Reducing RF Pollution and Radiation with Directed Beams

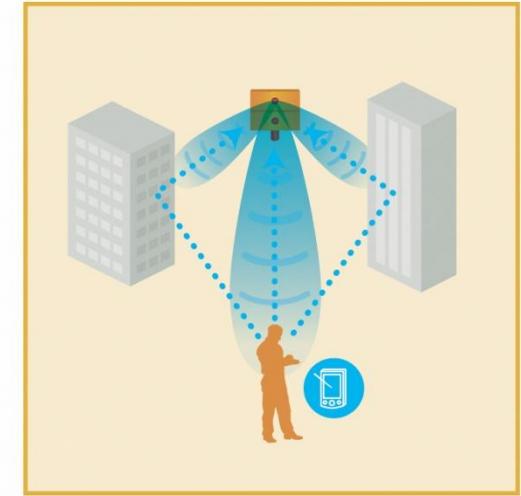
A typical Wi-Fi installation consists of omnidirectional antennas, which are constantly transmitting signals and looking for signals from connected devices. That means that at all times, there is radiation throughout the coverage area.

Alternatively, with a beamforming approach, radiation exposure is limited to a very short time. The beamforming system also uses omnidirectional antennas, but only to establish the location of a signal. Once that signal is found, the signal transmission is then handled via a concentrated beam.

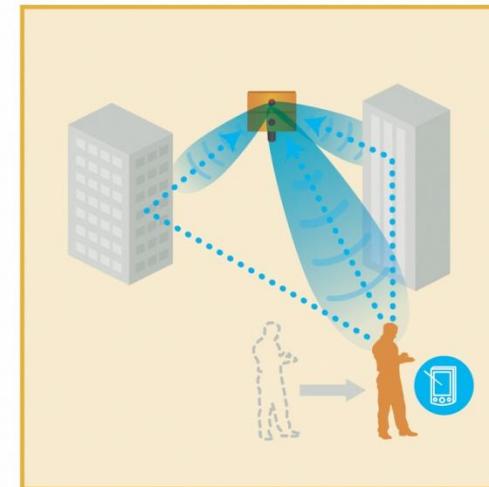
The equipment instantly detects the transmitted packet's direction of arrival and locks the antenna array on that signal. The Wi-Fi access points then create a beam for every packet, a beam that is directed toward the user being served. It is a focused approach that enables optimal performance, and reduced radiation, when compared with the use of omnidirectional access points that are transmitting and receiving in all directions.



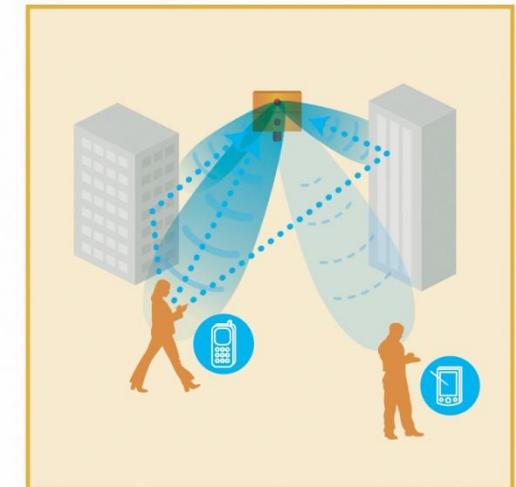
*Receive*



*Transmit*



*Receive/Transmit*



*Multiple Receive/Transmit*

## Are Wi-Fi Networks *Harmful* to Your Health?

The energy generated in a beamforming Wi-Fi system is concentrated in the direction of the client device. For only a fraction of a second, the user is exposed to the energy wave, but 99 percent of the time, he or she is not affected by any radiation.

That contrasts with a typical Wi-Fi system, in which the user is exposed to radiation essentially 100 percent of the time.

### Dealing with Interference

Because of the huge number of devices operating in the 2.4 GHz and 5GHz Wi-Fi band, typical Wi-Fi systems have to compensate for interference. They do this by lowering their receiver sensitivity. While this does allow the access point to ignore distant interference sources, it also reduces the range and capacity for legitimate clients.

In contrast to the 360-degree transmission of a typical approach, beamforming systems operate in a narrow 24-degree beam. That



results in interference mitigation that is 90 percent effective. Also, beamforming systems combat interference through directional correlators that distinguish the Wireless LAN signals from 2.4GHz cordless phones, Bluetooth devices, and other irrelevant signals to make a large percentage of the air time available.

The narrow beam delivered by beamforming access points is a proven radiation reducer, compared with regular access points that transmit to all directions. In the 2.4 Ghz band, only three non-overlapping channels exist. Dense deployments of standard access points create high levels of noise and reduce the total system capacity due to interference between adjacent cells.

Beamforming also takes advantage of higher antenna gain in order to reduce the amount of power needed to achieve the same desired capacity and coverage. Lower-power transmission means that the total amount of radio wave energy in the air is reduced, which means less exposure for individuals in the coverage area of the network.

### GoNet Systems Solutions

GoNet Systems Wi-Fi solutions have been developed specifically for large-scale, outdoor deployments. Powered by the xRF™ Smart Antenna beamforming and self-healing mesh technologies, the GoNet Wi-Fi platforms are ideal for maximizing network coverage, performance, and economics. At the same time, due to the small number of access points required to cover such area, these systems dramatically reduce the RF pollution.

GoNet Systems' GoBeam platform combines the company's powerful beamforming technology with the latest Wi-Fi standards. This approach enables the GoBeam access points to double or quadruple the coverage area, improving the user experience and increasing overall network capacity. This can cut capital and operating costs for the network in half compared with competing Wi-Fi approaches.

Using two radios – one at 2.4 GHz and one at 5 GHz – per access point, GoNet Systems can support up to 250 simultaneous users. Most importantly, GoNet Systems' solutions deliver much greater capacity. At any given point in the Wi-Fi network, GoNet is able to deliver twice the capacity that other radio manufacturers can. This is an important consideration since users are increasingly working with video and data-intensive applications in both their business and personal Wi-Fi usage.



## Are Wi-Fi Networks *Harmful* to Your Health?

In school settings, GoNet Systems equipment can be deployed outdoors in order to serve the students indoors. This keeps students farther away from any access points, which helps to further reduce any exposure to radiation, while delivering high levels of capacity, speed, and quality of service. There is even more reduction in radiation exposure since the same levels of performance can be achieved with less GoNet Systems equipment.

GoNet Systems combines powerful MIMO xRF™ beamforming technology with the latest Wi-Fi standards, delivering superior Wi-Fi performance in large-scale deployments.



With its ability to achieve higher antenna gain – as much as four times the level of other Wi-Fi systems, GoNet is able to use less power to deliver the capacity and coverage needed in the network.

This not only reduces operating costs, but also helps lower the total amount of radio wave energy and decreases exposure to those waves for Wi-Fi users.



## Are Wi-Fi Networks *Harmful* to Your Health?

Designed to provide superior Wi-Fi performance in harsh outdoor conditions, GoNet Systems access points deliver two to four times the range and capacity, along with 90 percent effective noise mitigation, reducing the total number of units required to provide the desired coverage. GoNet Systems is the ideal solution for cellular operators, service providers, and enterprises deploying large-scale Wi-Fi projects.

### In the End ...

... there may be very little effect on people's health from exposure to Wi-Fi and other radio waves. We just can't be sure at this point. However, there is no question that reducing that exposure – while lessening the network investment at the same time – is beneficial for both the providers of Wi-Fi access and the users.

Using GoNet Systems' advanced Wi-Fi solutions saves money and limits any environmental or health concerns. By requiring less equipment, fewer sites, and fewer installations, both costs and the risk of radio wave pollution are significantly reduced.





**GoNet Systems** provides carrier-class, outdoor Wi-Fi solutions to cellular operators and wireless service providers for 3G data offload and Wi-Fi access applications.

With beamforming access technology, flexible self-healing mesh architecture and specialized noise filters, **GoNet Systems** solutions deliver superior coverage and capacity.

The company's GoBeam platform has been specifically optimized for deployment alongside 3G networks, without suffering from performance degradation due to noise. The dual radio architecture combined with smart antenna technology enable cellular operators to deliver high data volumes effectively.

**GoNet Systems** outdoor Wi-Fi solutions are designed for bandwidth intensive services such as high-speed data, video streaming, W-VoIP, video surveillance, and smart city and smart grid applications. **GoNet Systems** Wi-Fi solutions are cost-effective and reliable, enabling service provider and cellular operators to effectively tap into the huge, and growing, Wi-Fi client installed base.

[www.gonetworks.com](http://www.gonetworks.com)

