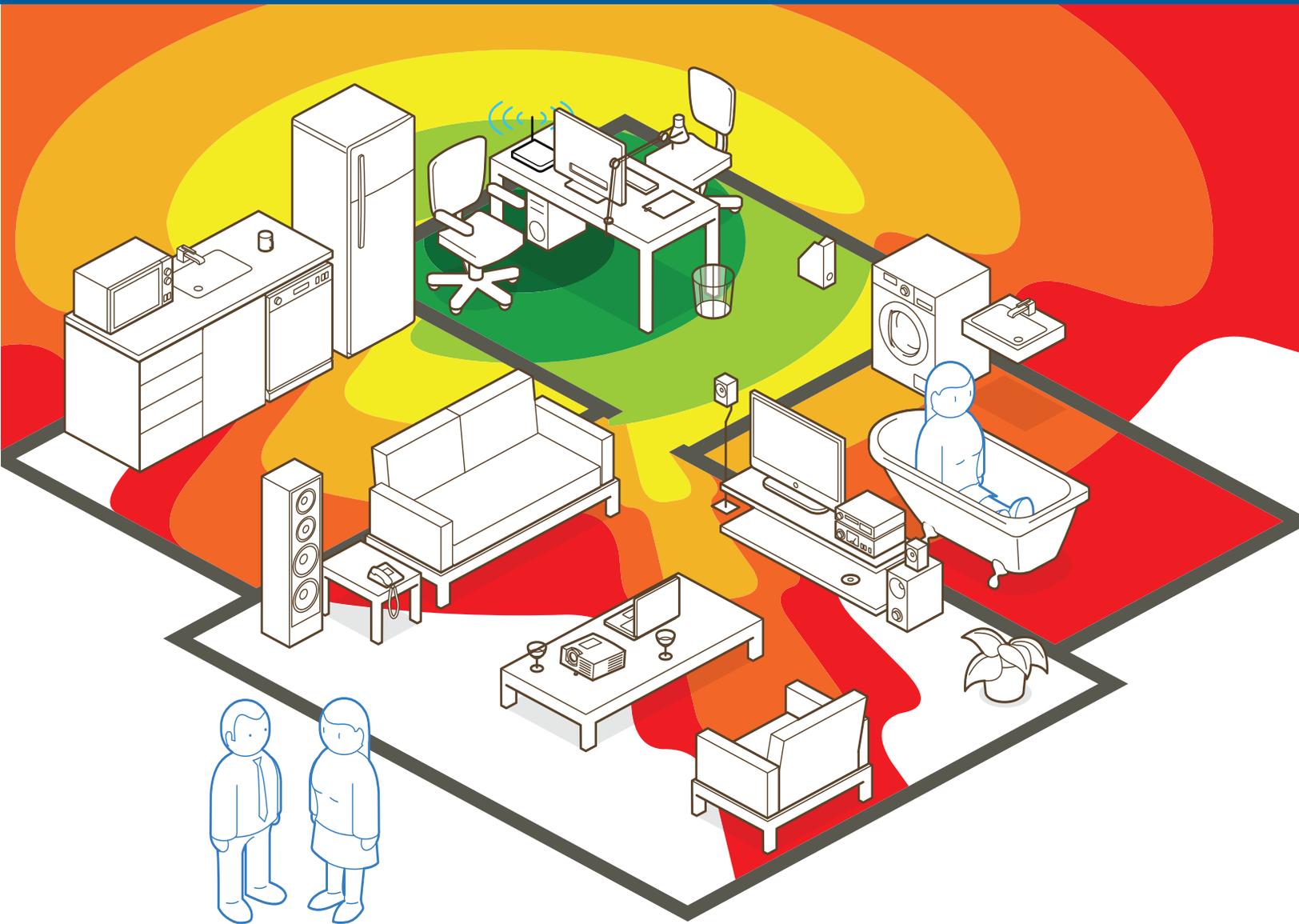


5 GHz vs. 2.4 GHz: The New Wave in Wi-Fi



 **DeepBlue**
A Passion for Wi-Fi



The Future of WiFi

The Converged Network

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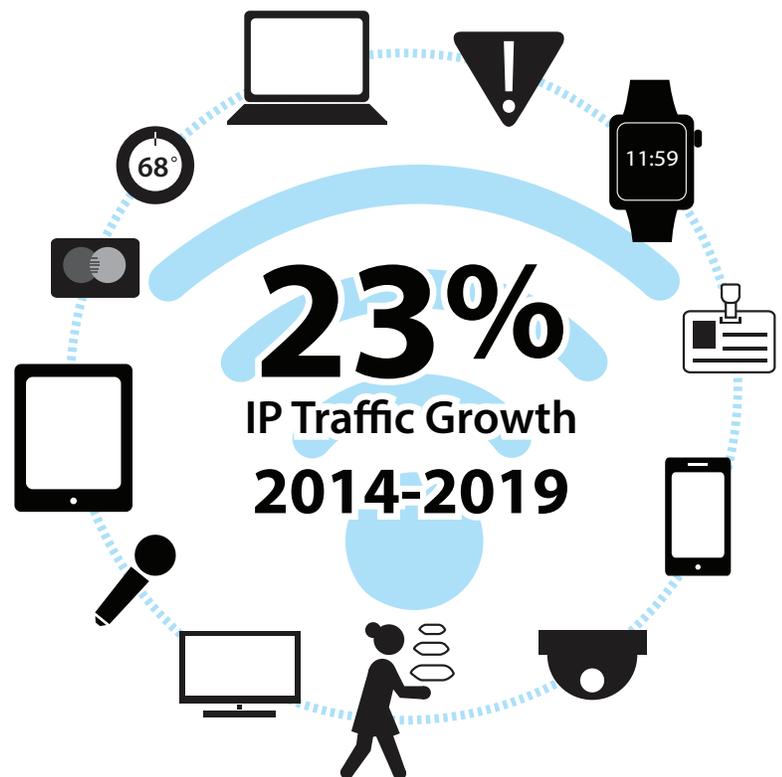
There is an answer to the congested airways and it's called 5GHz. On the rise and helping to alleviate the burden of overcrowding on the 2.4GHz band, the trends towards 5GHz-enabled technologies is perfectly timed. While we literally wake, work, eat, sleep, play and exercise with our devices, we can rest assured there is a way to offload some of this data to the 2.4GHz band while we take advantage of the speed and capacity of 5GHz.

5GHz vs.2.4GHz: The New Wave in Wi-Fi

5GHz may hold the promise of faster speeds - but how? And what is the best way to take advantage of it?

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5.0 vs. 2.4: Timeline of New Technology

It all comes down to bandwidth and frequency. The bandwidth – or the data transfer rate – of 5.0 is much greater than that of 2.4. But the frequency is higher for 5.0, and that means it doesn't travel as far as 2.4 – the lower frequency band. We have been using 2.4 with our Wi-Fi devices ever since you showed off your latest flip-phone to your friends. But to the surprise of many, 5.0 isn't new. It was developed at the very genesis of Wi-Fi technology and the initial standards developed to support it.



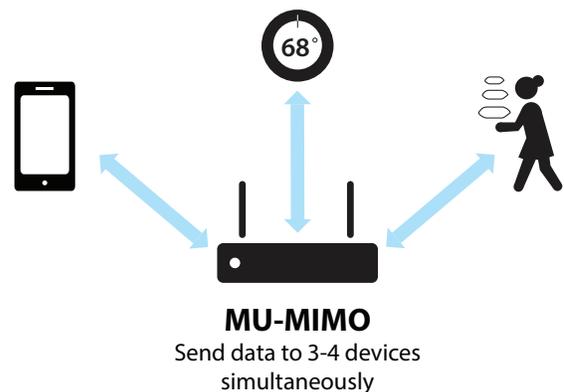
These standards, the “802.11” set, are developed by the International Institute of Electrical and Electronics Engineers (IEEE), that govern wireless networking transmission methods. Early on, the 802.11a (using the 5.0 GHz spectrum) and 802.11b (using the 2.4GHz spectrum) standards dictated how devices would communicate with Wi-Fi networks. 802.11b won out with devices that were cheaper and faster to market, thus the 2.4GHz spectrum became standard, not only

for Wi-Fi devices, but also microwave ovens, baby monitors, car alarms, cordless phones and Bluetooth devices. Oh yes, and flip phones.

Over the next 2 decades, revised standards meant increased speeds, improved coverage and as we all know, the advent of very sophisticated devices. The influx of new technology on a global scale also meant the 2.4GHz spectrum was increasingly noisy, crowded and starting to get frustrating – dropped calls, lost connections and network kick-offs. Now that devices like phones could be used to access the Internet, and with that the growth of everything from e-readers to wearables accessing streaming data, there had to be a better way to manage the over- burdened 2.4GHz spectrum.

5.0 vs. 2.4: A New Standard

Fast forward to 2016. The 802.11ac standard was ratified in January 2014. Most of the wireless routers utilizing 802.11ac now have dual band technology - or the ability to use both 2.4 and 5.0 GHz simultaneously. (If you have a router that was purchased recently, take a look – it's there.)



The very latest standard in Wi-Fi is 802.11ac Wave 2. It is different from the first 802.11ac wireless specification Wave 1 in that it utilizes Multi-user

Multiple Input Multiple Output (MU-MIMO) technology to help increase wireless speeds from 1.4 Gbps with Wave 1 to 3.47 Gbps - 6.93 Gbps. This means greater bandwidth to support high levels of data and video, as well as supporting concurrent communications for multiple devices and multiple users simultaneously (as opposed to the single-user multiple-input and multiple-output (SU-MIMO)

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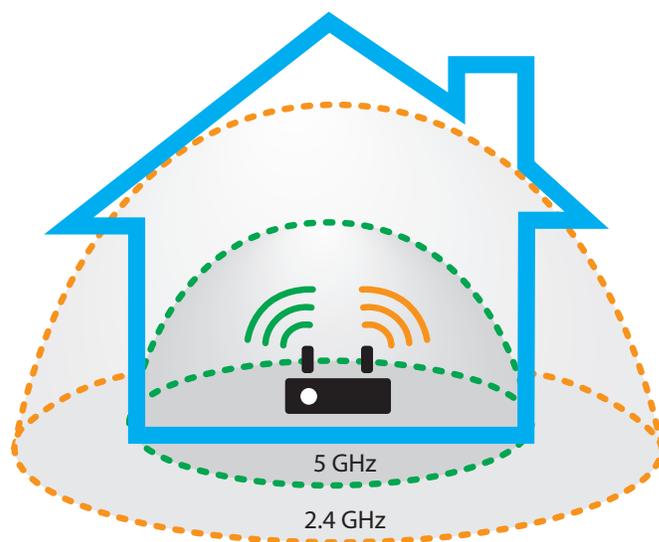
technology that supported one). In addition to making a network faster, MU-MIMO can aid in increasing its capacity, allowing it to handle more Wi-Fi devices and faster video and voice streaming. (Think Superbowl

Sunday with a houseful or stadium-full of guests – watching and streaming live video from all of their devices at the same time without interruption.)

Beamforming is a new technology that can also help improve bandwidth and throughput by concentrating signals that travel to the Wi-Fi router, optimizing the signal for greatest accuracy, speed, fewer errors, and instant bandwidth delivery. Think of it as having the accuracy and focus of a laser beam. When utilized with MU-MIMO, smart antenna patterns can determine and utilize the optimal signal path, ensuring crystal clear data transmission for multiple devices. With 23 channels to choose from on 5.0 (vs. 3 on 2.4) – the benefits are clear. With these multi-use technologies, everyone can access their devices at once without a loss of speed.

5.0 vs. 2.4: Advantages and Disadvantages

Since the 2.4 GHz wireless band is used by everything from your microwave to your Bluetooth speakers, it looks and feels like Friday rush hour traffic all the time. By contrast, 5.0 is a large, 5-lane highway early on a Sunday morning – lots of room, very little traffic and no roadblocks. As such, it is the perfect band when you need to transmit large amounts of data – like streaming live audio or video, without interruption and at remarkable speeds. When you have both together – it makes for a fantastic solution to network overload.



But like all technology, nothing is perfect. And that includes 5.0. Very simply, 5.0 is less crowded and provides faster data downloads, better streaming, fewer interruptions and an overall improved Wi-Fi environment. But there is a downside too. The thing about radio is – the higher the frequency, the shorter the range. The 5.0 GHz band has a smaller range and doesn't penetrate solids – like walls – as well as 2.4. It can't travel the distance needed for excellent data

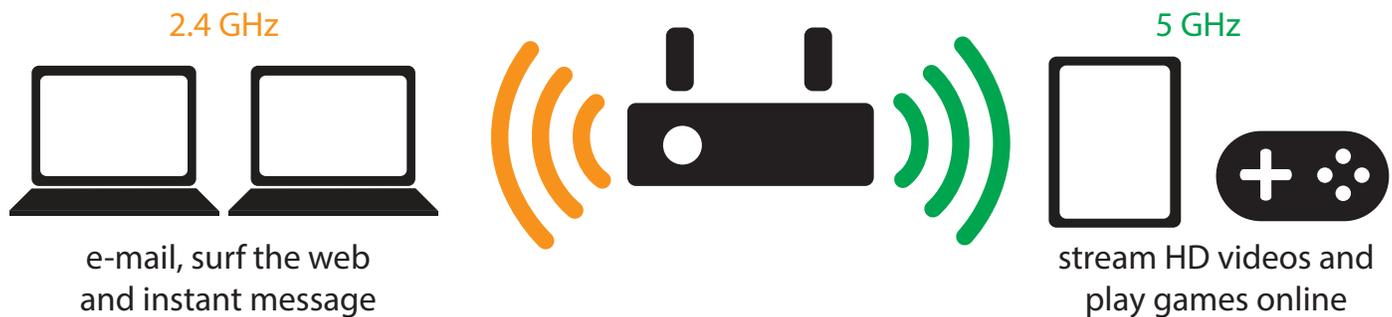
downloads from anywhere. So what may work while you are in your home office upstairs may not work at all when you are in the kitchen. This makes it difficult for larger locations like hotels, office buildings, schools and other structures to utilize 5.0 without combining it with the increased coverage and saturation of 2.4. There are also many users in public places who are using only 2.4-enabled technology, so at least for the immediate

future, dual-band solutions will become the norm.

There is also crowding to consider. If you live in a city with tall buildings and tons of neighbors competing for 2.4 space, 5.0 may be the best solution for your apartment. If you are a farmer and your closest neighbor is 5 miles away, you might be just as happy with 2.4.

5.0 vs. 2.4: Get The Best of Both Worlds

Based on the surrounding environment – people, places and things, a combination of 2.4 and 5.0 – or dual-band- is usually the best solution for the most flexible, reliable coverage. Most modern mobile devices look to connect via 5GHz first and 2.4 second. But not everyone has the latest technology. To accommodate the most users, hotels, schools and larger facilities should be looking for a dual-band network (2.4 & 5 GHz) solution, to double potential wireless bandwidth, support backwards compatibility with older 801.11 b/d/n devices and to help eliminate interference. Since many devices have not yet caught on to the 5.0 wave, developing networks with dual-band capacity is key to coverage for all.



For home networks, those devices that have the capacity to handle the most data – gaming systems, desktop or laptop computers or your Internet –enabled TV systems, should be connected to your 5.0 for the fastest speeds. Think line of sight – if you can see the router or you have an open window, thin wall or a cubicle wall in between, 5.0 would be the best bet. Everything else? 2.4.

What lies beyond 5.0 remains to be seen – but one thing is for sure: with faster downloads and increased capacity, 5.0 opens the path to better application performance, reduced latency and multiple users with concurrent sessions – all running full speed ahead.

With the explosion of Wi-Fi technology comes the need for expert management, installation and support of wireless networks to ensure compatibility of current devices and accommodate the needs of tomorrow. When looking at how much to invest in future proofing your technology, take into consideration the costs of implementing a new network

with almost unlimited potential for adding new services in the next 10-15 years as your needs change. The integration of new technologies certainly increases the complexities of the Wi-Fi network but when done correctly – with a well thought out design and implementation, can lead to significant operational efficiencies like increased capacity, easier network management and optimization of services. Contact us today to see how we can help you make the most of your Wi-Fi network.

Headquartered in Latham, NY and with satellite offices around the United States, Deep Blue has been an industry leader for more than 10 years, designing, installing and managing WiFi networks. Deep Blue has made the INC 5000 list of the fastest growing companies the last three years running and has emerged as the leader in meeting the needs of the converged property, integrating hospitality, retail, and entertainment services. With a Passion for WiFi, Deep Blue is helping businesses all across the United States, Canada, Mexico and the Caribbean, to elevate the WiFi experience for guests, while increasing operating efficiencies for business. For more information visit www.deepbluecommunications.com, contact sales@deepbluecommunications.com, or call 518-389-2711.

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Moving Ahead with Deep Blue Communications

When planning for any new technology, think at least 10 years out and focus on not one – but all components of your network. Consider the time and cost associated with updating current Wi-Fi networks by seeking out experts who can provide a comprehensive design for all of your integrated systems – both present and down the road. With the right strategy, your entire network can be designed for efficiency and scalability, enabling districts to add new services and functionality in a more cost effective way.

Network performance can be configured and monitored from a single common infrastructure– onsite, or off –streamlining management and making it easier to identify and address issues before they become a larger problem.

The good news is Deep Blue Communications is a certified, qualified and committed technology company eager to help schools navigate the technology systems and services needed to accommodate this generation of teachers and learners, and prepare them for what lies ahead.

