



Broadband: Understanding Wireless Channels

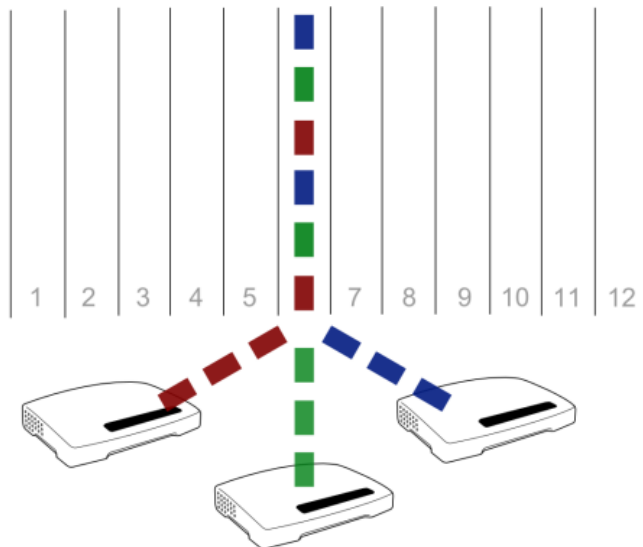
Aim of this article:

This article describes how the different wireless channels are used and how they interact with each other. Understanding this information is helpful when diagnosing problems with Wi-Fi signals in areas where there are a large number of Wi-Fi networks.

Wi-Fi Channels:

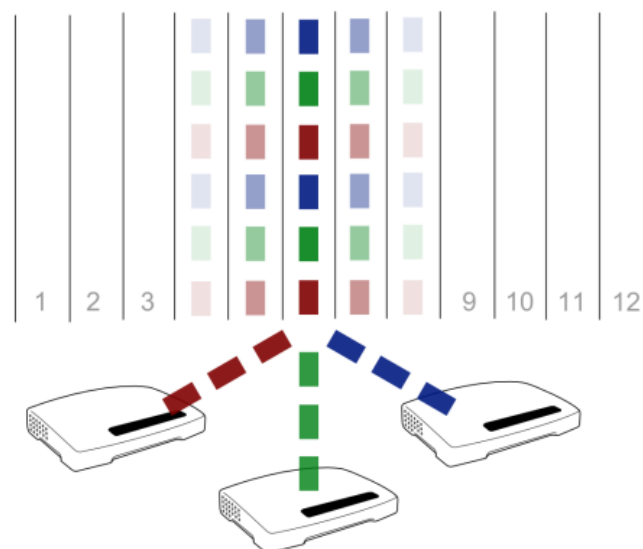
Every Wi-Fi network transmits and receives data on a certain frequency, or channel. As Wi-Fi data is digital, many different devices can communicate successfully on the same channel. By default the channels used are typically either channel 6 or channel 11.

As shown in the simplified diagram below, three routers are all using channel 6. The data isn't interfering, however the channel is a little contended.



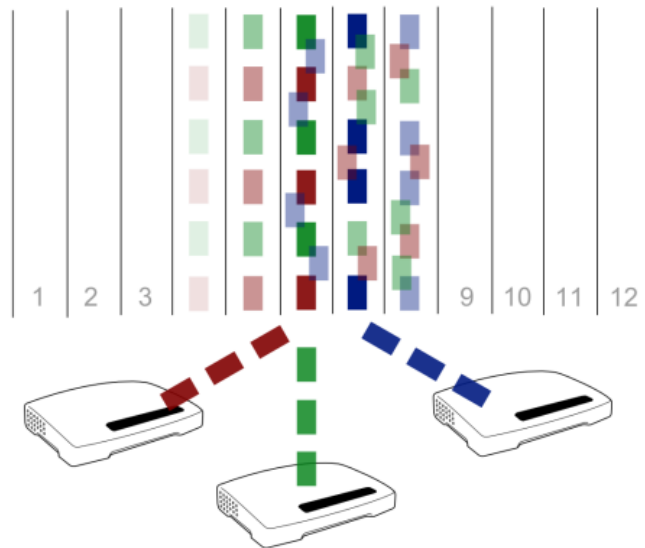
To help to improve this situation, it would seem logical to move one of the routers to another channel. At first glance channel 7 seems like a good option; there's nothing else using it, so why not?

What's actually happening is this:



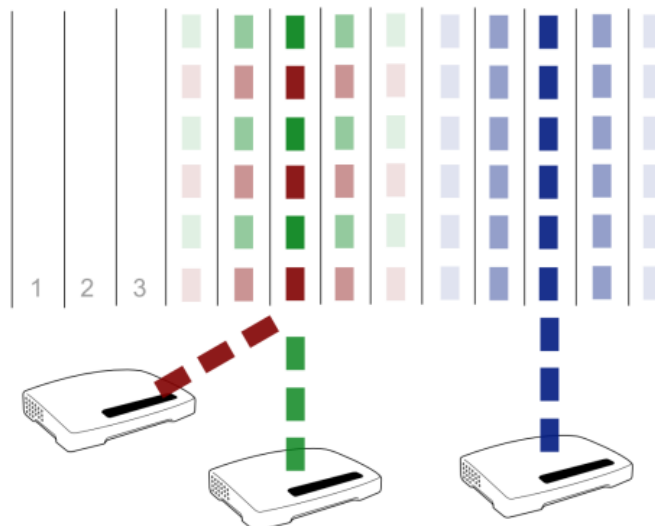
Each router is using the same channel, however the transmission isn't restricted to one frequency. The communication is spread across five channels in total, from channel 4 for channel 8, so channel 7 isn't as free as first thought.

Therefore, changing to channel 7 would cause this to happen:



They can no longer arrange themselves in an orderly fashion and they all begin to interfere with each other. This actually causes more of an issue than contention occurring on a single channel.

So what about other channels? Keeping in mind that we need two spare channels either side, channel 11 seems like the next best channel to go for. Using it looks like this:



Each signal is now being transmitted correctly, and the contention on channel 6 is a little better. Channel 11 is completely free, so the data is communicated efficiently. Channel 1 would also be a good channel to try and would behave in the same way as channel 11.

Additionally, channel 14 is the next best frequency after 11, however not all equipment can use this.

Changing the wireless channel:

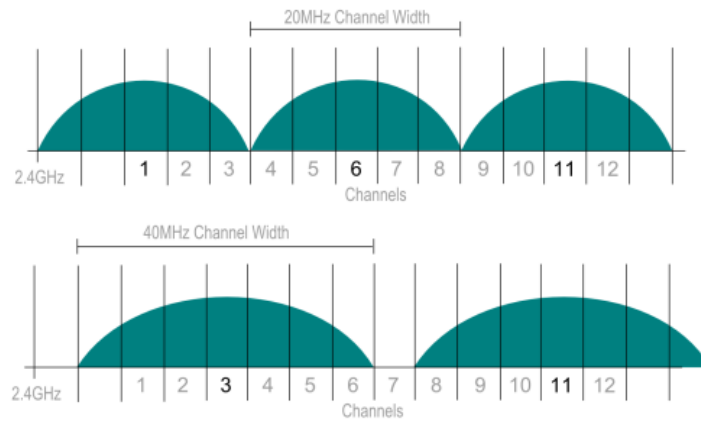
The following article will help you change the wireless channel on your router:

[Changing wireless channel](#)

Further information:

Going into a little more depth, the information above is based on the routers using a 20MHz channel width. This means the signal is transmitted over five channels.

Some routers can use 'wide channels'. This is a channel width of 40MHz, which uses seven frequencies to transmit more data.



The benefit of wider channels is that more data can be transmitted, resulting in faster Wi-Fi speeds. However, interference with other 20MHz channels can be an issue, much in the same way as with the channel 7 example discussed previously.

In most cases the router handles the channel width selection automatically, so it's not normally something you need to change, but could be a reason you see slower speeds than expected.

For example:

You may buy a new router and install it in your home. Ideally the router will use a channel width of 40MHz, which should give you very good network transfer speeds. However, if there are lots of neighbouring Wi-Fi networks, they may cause too much interference with the 'wide' 40MHz channels. This interference could result in greatly reduced performance.

The router should now switch to 20MHz, which would typically be slower than 40MHz, but because of the reduction in interference the speed of your network should improve. The speeds may not be the maximum possible for the Wi-Fi technology in use, but the router will always try to use the fastest connection achievable in your premises.

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<https://support.zen.co.uk/kb/Knowledgebase/Broadband-Understanding-Wireless-Channels>

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