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**Why is 2.4GHz chosen as the unlicensed frequency that is now used in ubiquitous wireless technologies such as WiFi, Bluetooth, Zigbee? Why not 1.4GHz or something else?**

4 Answers

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[Phillip Remaker](https://www.quora.com/profile/Phillip-Remaker), iOS user, Android dabbler

[Updated Jul 10, 2015](https://www.quora.com/Why-is-2-4GHz-chosen-as-the-unlicensed-frequency-that-is-now-used-in-ubiquitous-wireless-technologies-such-as-WiFi-Bluetooth-Zigbee-Why-not-1-4GHz-or-something-else/answer/Phillip-Remaker) · Author has **9k** answers and **45.6m** answer views

Originally Answered: [Why are a lot of data sent over the 2.4Ghz frequency range?](https://www.quora.com/Why-are-a-lot-of-data-sent-over-the-2-4GHz-frequency-range?no_redirect=1" \t "_top)

The 2.4GHz band is one of the [ISM bands](http://en.wikipedia.org/wiki/ISM_band) (Industial, Scientific, and Medical) reserved for unlicensed radio use.  
  
There are 5 such bands cleared for worldwide unlicensed use; one of them is the 2.4GHz band.  That was the band reserved in 1947 for for the then-recently discovered microwave cooking, specifically, for "radio equipment which, although not used for communications, is capable of causing extensive interference to radio communication services.  Of particular concern are diathermy and industrial heating units, and miscellaneous electronic devices."  ([FCC 1947 Annual Report](http://transition.fcc.gov/Bureaus/Mass_Media/Databases/documents_collection/annual_reports/1947.pdf), page 50)  
  
Over time, data transmission techniques which could work in the presence of high interference emerged to use the blocked-out 2.4GHz band for short-range digital transmission of data in short-range "cells" with high spatial re-use of the frequency space. Cordless telephones were the first communication devices I remember seeing in the space, eventually followed by high speed data devices, culminating the wildly successful IEEE 802.11 family of standards and the near ubiquitous Wi-Fi that we all enjoy today, more than a half-century after those frequencies were set aside for a totally different use.  Bluetooth, Zigbee and other protocols take advantage of the same bands.  
  
The exact answer to the question of "Why 2.4GHz?" was covered in a crowdfunded project by Hugh O'Brien, looking at FCC records from 1946 and 1947.  
[Why 2.4GHz? Chasing wireless history](https://www.indiegogo.com/projects/why-2-4ghz-chasing-wireless-history#/updates)

It was driven by Raytheon, in advance of their RadarRange and microtherm products.  
Raytheon wanted 2600-2700 megacycles, but settled for 2400-2500.  
The frequency choice was based on a combination of empirical measurements of heat penetration for various foodstuffs, design considerations for the size of the magnetron, and frequency considerations for any resulting harmonic frequencies.  
GE were making a similar product at the time, in the 1000 mc region, and decided that having 2400 open would allow them to generate harmonics from a fundamental of 1200. This, and some other smaller reasons, swayed the FCC towards 2400.  
The decision was somewhat rushed, as Raytheon had given the FCC demonstration RadarRanges in August ’46, and was eager to get them to market as it had several large pre-orders. Medical diathermy, and the interference it caused, was a serious consideration at the time, and likely the main motivation for the ISM bands at all, but since it tended to lower frequencies, and the 3GHz region was relatively new territory, Raytheon were able to get 2400 assigned ahead of of the rest of the diathermy driven ISM bands, which still required some deliberation.

Note: megacycles or mc were the words used for megahertz and MHz prior to the 1970s. 2400 MHz is 2.4 GHz.

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[Rupert Baines](https://www.quora.com/profile/Rupert-Baines), VP marketing at Picochip. Pioneered femtocells. Worked on WiMAX, WCDMA/HSPA and LTE.

[Answered Nov 20, 2014](https://www.quora.com/Why-is-2-4GHz-chosen-as-the-unlicensed-frequency-that-is-now-used-in-ubiquitous-wireless-technologies-such-as-WiFi-Bluetooth-Zigbee-Why-not-1-4GHz-or-something-else/answers/8140754) · Author has **9.2k** answers and **20m** answer views

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Spectrum is scarce & valuable.  
Think of it as as land.  
In general = people own it.  
  
There were several bands allocated to "unlicensed" or "license exempt" uses  
  
One of them was 2.4GHz  
  
That was regarded as "useless" - partly because it is the band microwave ovens use so was very noisy  
  
Of the many people who might use it some turned out to be WiFi and Bluetooth, which are hugely popular.  
  
So there is a **lot** of data  
  
Increasingly though WiFio is starting to use the 5.xGHz band, which is less croweded.

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To take a step back, the question must be asked - what frequency options do you have when sending data. The answer is anything below and above 2.4GHz.  
  
The basic answer is that 2.4 GHz is an arbitrary number but one in which the FCC decided upon. A glance at FCC regulations confirms any  suspicions. A band of frequencies clustered around 2.4 GHz has been  designated, along with a handful of others, as the Industrial,  Scientific, and Medical (ISM) radio bands. Unlicensed products such as microwaves or wi-fi are on 2.4GHz or 900Mhz frequencies. You don’t need a license to operate on them. T...

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[Kelly Kinkade](https://www.quora.com/profile/Kelly-Kinkade-1), Amateur radio licensee AB9RF since 2008

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The 2.4 GHz band used for microwaves (and for WiFi) was set aside, long ago, as one of the ISM (industrial, scientific, and medical) bands because this particular range of frequencies is especially subject to scattering and absorption by water molecules, which makes it especially poor for use for communication, and thus a good candidate to be one of the bands set aside for noncommunicative uses.

It is incorrect that this band was set aside for microwaves because this frequency is especially good for microwaves; rather, it was set aside for microwaves because it is especially *bad* for communic...

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