eiere Wireless Router Frequencies

June 2014 As far as I know, all wireless routers for home use are either single band or dual band routers. This means they are capable of using frequencies in either the 2.4 GHz band or the 5 GHz band or both. There are a number of different protocols for data transmission. Most routers will allow the user to choose the protocol. *(A protocol simply defines how data is transmitted.)*

2.4 GHz Band This is a specific set of 14 frequencies ranging from 2412 MHz to 2484 MHz in **steps of 5 MHz**. Each central frequency is assigned a Channel Number from 1 to 14 to simplify discussions and settings. In practice, most routers can only use channels 1 – 11 with the others reserved for special purposes. In order to transmit data, a range of frequencies around the central frequency is needed. This is called bandwidth.(1) **The bandwidth for each channel in the 2.4 GHz band is 22 MHz**(2). Since this is much larger than the separation between channels, care must be taken so that two or more routers within range of each other do not use adjacent channels. That would cause interference. (*Using the same channel does NOT cause interference but can slow down the rate of data transfer*.)

Channel	Frequency
1	2412 MHz
2	2417 MHz
3	2422 MHz
4	2427 MHz
5	2432 MHz
6	2437 MHz
7	2442 MHz
8	2447 MHz
9	2452 MHz
10	2457 MHz
11	2462 MHz

5 GHz Band This is also a specific set of frequencies with each one assigned a Channel Number. There are several groups and channels are separated by 20 MHz within each group. However life is more complicated here because the individual frequencies (and Channel Numbers) are different depending on the protocol used and the geographic region. I will stick to North America(3). The 802.11n channels are:

There are two bandwidths for .11n, 20 and 40 MHz.(2) Which one is used in a particular router depends on the manufacturer. Apparently, home users should only use channels 149 – 153.

Dual band routers can use either band or, in many cases, use both simultaneously. I do not know exactly how this is accomplished. However, there seems be a standard pairing of channels; e.g. channel 153 with channel 6. Data is then transmitted simultaneously on both channels.

Channel	Frequency
36	5180 MHz
40	5200 MHz
44	5220 MHz
48	5240 MHz
52	5260 MHz
56	5280 MHz
60	5300 MHz
64	5320 MHz
149	5745 MHz
153	5765 MHz
157	5785 MHz
161	5805 MHz
165	5809 MHz

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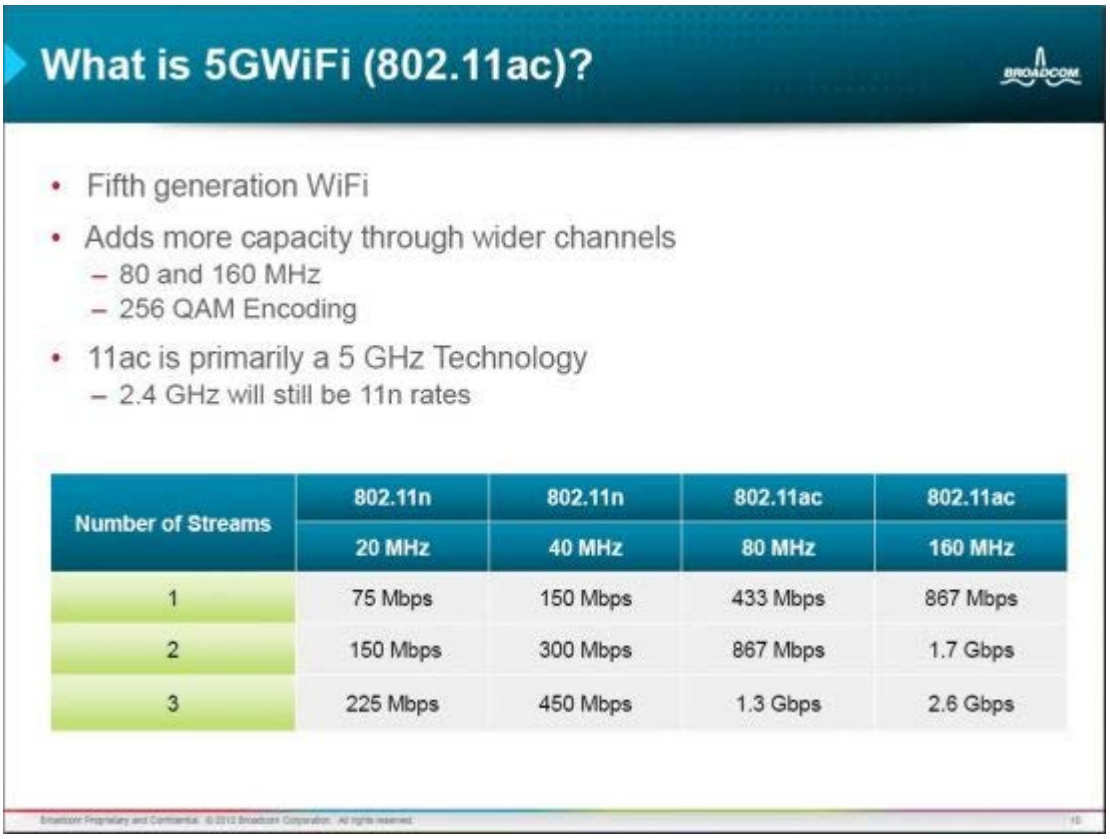
(1) Bandwidth Some authors confuse bandwidth with speed. There is some justification for this oversimplification as long as one does NOT talk about wireless communication. However, thinking that bandwidth is speed can be very misleading when discussing wireless. Bandwidth, in its basic definition, is just a range of frequencies. If all other factors are the same (and they never are), higher speeds (data transfer rates in Mbps) usually require higher bandwidths in practice.

Here is an image from the web:
http://www.smallnetbuilder.com/wireless/wireless-features/31694-why-80211ac-will-kill-the-5-ghz-wi-fi-band



Real life is not quite this simple but you can see the general trend.

(2) Difference 8011 protocols called for slightly different bandwidths; e.g. 20 MHz instead of 22 MHz. As a consequence, different routers may use slightly different bandwidths.

(3) Geographic regions as specified by the 802.11 protocols are North America (-A), EMEA (-E) which stands for Europe, Middle East and Africa, Japan (-J), China (-C) and Australia (-N).