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## Wireless Routers Background

Here is some general information on wireless routers for those who feel they want a very simple overview of the current situation. We can discuss this at the meeting if anyone requests.

**Wireless Routers** use microwaves to communicate with a variety of digital devices. Those devices include laptops and tablets, streaming video for your TV such as Roku and Apple TV, smart phones which can use Wi-Fi to save mobile minutes and other less-common devices.

These microwaves are fundamentally like the ones in your microwave oven except these are sent through the air instead of being confined to your oven and they are at a much lower power.

All routers operate at frequencies in one of two bands; 2.4 GHz and 5 GHz. Older routers use only 2.4 GHz but newer routers (e.g. last 4 years) can use both bands. A specific frequency is usually called a 'channel', such as channel 6, to avoid spelling out the frequency 2437 MHz (2.437 GHz).

In fact, each channel operates over a range of frequencies called the bandwidth. A typical bandwidth for an older router is 20 MHz. Then channel 6 is really  $2437 \pm 10$  MHz. This is important because, in a very rough sense, the larger the band width the faster the maximum rate of data transfer. Usually, the rate of data transfer is what determines the performance of your system.

A typical download speed (data transfer rate) for Road Runner at Time Warner is 20 Mbps under 'ideal conditions'. This does not take into account slowing down by the server sending you the information (e.g. Netflix slowing down on Friday night). This would correspond very roughly to a bandwidth of 20 MHz. Please DO NOT think there is a simple relationship between band width and maximum transfer rate. Just remember that usually larger bandwidth will allow for a larger data transfer rate which is what you are really interested in. There are many other factors that influence your download speed. Those details are what you want to concentrate on in practice.

**Practical Matters** As mentioned in my eMail on wireless routers, I needed to "tweak" my router. My laptop started taking longer to connect to the Internet than it used to and the streaming video (e.g. Netflix) to my TV was unsatisfactory. It would pause to buffer and often drop the wireless connection.

I used a free Wi-Fi sniffer to discover that every wireless router in my immediate neighborhood was using the same channel 6. This is the default for many popular routers. I switched to a channel far from 6 and my laptop performs better and the streaming video is perfect.

How do you discover your situation. Get a free Wi-Fi sniffer program.

<http://nutsaboutnets.com/netsurveyor-wifi-scanner/> NetSurveyor (my favorite)

<http://www.xirrus.com/Products/Network-Management-and-Software/Network-Management/Wi-Fi-Inspector> Wi-Fi Inspector

<http://www.techspot.com/downloads/5936-inssider.html> inSSIDer

*Be sure you get the free version; they are pushing the paid version elsewhere.*

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Details for the 2.4 GHz band. There are 14 channels, each with its own, unique central frequency. Channel 1 -11 are the “standard” channels; 12 & 13 may or may not be available with your router. The central frequencies run from 2412 MHz to 2484 MHz in units of 5 MHz. For example, Channel 1 is 2412 MHz, Channel 2 is 2417 MHz, Channel 3 is 2422 MHz, etc.

However, each channel is assigned a bandwidth of 22 MHz. (The whole bandwidth is not necessarily used. How much is used depends on many factors such as speed; i.e. how fast data is transferred, but it is difficult to determine just how much is used.) Thus, several channels can overlap, causing interference. For example, Channel 1 could, in theory, broadcast as high as 2423 MHz (2412 + 11). Channel 2 could broadcast as low as 2406 MHz (2417 – 11). These could interfere all the way from 2406 to 2423 MHz, causing terrible problems.

The nearest channel to 1 which cannot possibly interfere is channel 6. That is why the default channels are 1, 6, 11. You are usually better off sticking with one of these channels even if you have to live with someone using the same channel you chose. There may be extreme cases where you would use a ‘non-standard’ channel. You would just have to experiment.

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### **What is an ‘SSID’?**

SSID stands for Service Set Identifier, which is a 32-character sequence that uniquely identifies a wireless LAN (WLAN). **In other words, the SSID is the name of the wireless network.** (Reference Indiana University Knowledge Base).

Two SSIDs and different channels.

<http://superuser.com/questions/373175/two-ssids-on-one-router>

I have a Roku 2 device to stream video to my Television set. It creates a second SSID on my network. Roku forums state that this is for the Roku remote and does not slow down the video at all. If you see two SSIDs on your network, don’t panic.

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