



Weird & Wireless: Best way to connect iPods for car audio



Welcome again to the wonderful but sometimes weird world of wireless comms, written by Joel Young, [CTO of Digi International](#).

What is the best way to connect an iPod into my car's audio system?

Okay, I admit it, I'm cheap. I don't like overspending. I always like to try to do things myself or get by piecing some lower-cost, good-enough solution together.

So I don't drive a fancy new car with a dedicated connection for an iPod (or other portable music player).

Most new cars today have a nice little port for connecting a music player. Some even come with a fancy docking station built in. Even with the cash for clunkers program, I couldn't justify to myself the need for a new vehicle.

So, if you are like me, there are two practical approaches for connecting that iPod into your car: (1) you can use an FM modulator or (2) you can use a cassette adapter. Which is better?

Like most things, the devil is in the details and there is no perfect answer.

An FM modulator creates your own low power FM radio station which then gets piped into the existing FM radio in your car. In turns out that there are two ways to connect. You can wire one of these modulators into the cars antenna port or you can broadcast over the air. The power is low enough such that you don't break any federal laws.

Unfortunately, the wired version requires disassembly of the dashboard, so I immediately rule out this approach and go with the mini-radio station.

The other way is to purchase a cassette adapter. This looks like a cassette tape with a cable hanging off it. It takes the incoming audio and outputs the magnetic signal to the cassette player's head, effectively masquerading as a cassette tape.

In order to decide which is better, you need to first decide what is more important - aesthetics or audio quality. If pure aesthetics is your thing, then you are stuck with the FM modulator. I say this because the cassette adapter has a wire coming directly out of the mouth of the cassette player and there is really nothing you can do about it.

A cable is destined to hang loosely down your dash, presenting a sort of hacked up view.

I really wish I could find one that has a Bluetooth radio inside, but with cassette players becoming extinct, I haven't been able to locate one. The FM Modulator has no wires.

Now if audio quality is more important, then the decision does not appear to be as obvious. When we think of audio reproduction, most of us think of two factors: Frequency response and noise.

Frequency response has to do with the frequency range that is covered by both the amplifier system and the media - most of us think of this as low notes to really high notes. A good audio system will generally provide a range of 20 to 20,000 Hz, some go as low as 10 Hz which I can't hear anyway. However the media may be somewhat narrower.

A typical studio CD can cover the full range up to 20,000 Hz, while the FM radio is limited by the FCC to 30 to 15,000 Hz. This means you won't hear those nice high notes from an FM radio. A cassette can generally do a little better, being in the 30 to 18,000 Hz range.

Unfortunately for me, my hearing has degraded enough over the years that I generally can't hear any of the really high notes anyway. So that leaves us the all important noise factor.

Typically we measure noise by something called a Signal to Noise Ratio (SNR) measured in decibels or dB. This, simply enough, is a measure of the strength of the stuff you want to hear as compared to the background noise inherent in the equipment and media; the bigger the number the better.

A CD player will have a SNR approaching 100 dB while the cassette, by looking at the specs of different players, may be as low as 50 dB (unless you have one of those fancy cassette players) and the FM radio maybe closer to the 70 dB range, assuming a strong FM station. At first glance this may appear to be a slam dunk.

If my hearing isn't good enough to hear the high notes and the radio provides a better SNR, it's the FM modulator all the way. Unfortunately personal experience doesn't prove this to be true.

It turns out that the key is in the words "strong FM station."

Where I live, I find the FM spectrum really crowded, meaning that existing stations appear as noise to my little iPod station.

In addition, my cars antenna seems to be better suited for picking up signals from the outside, instead of those originating near the cars console. Hence I've found this "interference" can easily take away another 20 to 40 dB in SNR, while I've found my \$9 cassette adapter to be nice and deterministic. So if you can tolerate the dangling wire, go with the cassette adapter.



Joel Young, VP of Research and Development and CTO at [Digi International](#), has more than 22 years of experience in developing and managing data and voice communications. He joined Digi International in June 2000 and in his current role he is responsible for research and development of all of Digi's core products.

Prior to joining Digi, Joel was VP of Sales & Marketing at Transcript International where he was responsible for sales, marketing, and product development for all information security products. During his tenure at Transcript, he also served as VP of Product Development and VP of Engineering where he was responsible for engineering, research and product development for wireless communications products, cellular telephony, wireline telephony and land mobile radio, data security and specialized digital radio products.

He also served as District Manager for AT&T Business Communications Services where he was responsible for the creation and implementation of voice processing and network database strategies, including deploying new voice processing platforms into the AT&T switched network for private network and other outbound calling services.