

TECH ONE ON ONE

Digital VHF Needs A Power Boost

By Harry A. Jessell

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Perhaps the biggest surprise of the DTV transition has been the poor performance of many VHF stations as digital-only stations. On the whole, their signals don't seem to reach as far or penetrate buildings as well as those of their UHF counterparts.

Since the June 12 analog cut-off, broadcast engineers at VHF stations have been trying to sort out the problems of digital Vs. And in this effort, they have had the support of consulting engineers, experts on the peculiar behavior of radio frequencies.

Among those deep into DTV is Richard Mertz, a principal with [Cavell, Mertz & Associates](#).

In this interview with *TVNewsCheck*, Mertz says high-band VHF (channels 7-13) for fixed and mobile reception can be remedied with more transmission power, something that he hopes the FCC will consider granting. As for low-band VHF, his message is simple: Abandon all hope.

An edited transcript:

What's the problem with reception of digital VHF signals?

A lot of people don't want to install an outside antenna and, if you recall, the planning factors for DTV are based on a properly oriented, high-gain antenna mounted 30 feet in the air outside. Rabbit ears inside don't take into account the attenuation that the building materials in a home provides and or the reflective surfaces in a home that cause multipath.

I remember as a kid fighting with the rabbit ears and trying to tune in the station and you got an acceptable picture. Now with digital, you can't do that. Kind of getting the signal is not acceptable anymore. You won't get a picture with a ghost. You'll get nothing. I know from my own experience: A lot of people don't want to get up and move the rabbit ears around.

Another problem is the receivers. We have no receiver standards. We have decoding standards, but we don't have performance standards for the receiver. So depending on which receiver you have, you have different sensitivities, you have different abilities. Some of the decoder boxes can handle a severe amount of multipath; others cannot.

In some cases, in trying to get a good signal, people overdo it. I've been to several homes where people are complaining they can't get high-band VHF stations and the problem is they put an antenna amplifier between the antenna and the converter box. A lot of these amplifiers are noisy or they're overloading the front end of the converter boxes.

You mentioned high-band VHF. What about low-band VHF. Is that a particular problem?

We don't recommend using those channels. I know that several people have gone back to ch. 6, but I don't think that's a wise idea. There have been different studies done and papers published that talk about man-made noise, celestial noise in those frequencies.

So, if you're in the low V band, you should be thinking about getting out of there.

I don't think they should have gone there in the first place. It's spectrum the commission may recover eventually. I don't think it works very well. Propagation-wise, studies years ago suggested that high-band VHF was the best place to be and we tried to move people there as we saw fit.

What is the inherent problem with high-band VHF that makes it harder to receive?

This is a multifaceted problem, but it's basically power limitation, especially in the Northeast. You need more power to overcome building attenuation and get to indoor antennas.

The maximum power you're allowed in high-band VHF is 30 kilowatts at 305 meters of average terrain. The reason they did that

was because they were working towards replication of the analog grades. Some of the planning factors may have been very conservative and didn't really take into effect how people actually watch TV over the air.

And an amplifier in the antenna line won't help?

Typically, you try not to have the amplifier. Let me give you an aside. We had a UHF LPTV client that was being picked up and carried by a local cable system, but the signal would drop out periodically. They had a dedicated antenna for this one low-power television station. I talked to them on the phone and discovered that the antenna was pointed in the wrong direction. Then, I asked if the signal passed through any amplifiers. Yes. Can you unplug the amplifier and bypass it? Can you plug the antenna directly into the receiver? We can. Do you have enough signal now? Oh, more than enough. They haven't had a drop-out since.

What is it that the amplifier does that causes the signal problems?

It can either overload the initial stages in the receiver or it can create noise that the receiver thinks is data because of the nature of the ATSC signal. So by taking the amplifier out you remove a variable that creates trouble.

If more power is the solution, how do broadcasters go about getting it?

We have been able to secure for several clients experimental authorization at higher power, but when you get an experimental authorization you're creating more than a half a percent new interference to other people and you have to demonstrate that you're not going to harm them. I've done measurements to show that our stations are not going to harm these other stations.

But you need a permanent solution. Would you like to see the FCC increase the power for VHF stations?

I would like to revisit the power caps, especially the Northeastern Zone One. I'm working with different groups to take the commission's temperature to see if it would entertain this at this time.

In your opinion, do you think you can jack up the power limits for everybody without causing a lot of interference among the stations in the band?

There's going to have to be a cooperative effort among all the broadcasters to increase power above the levels that they currently have. Everybody in high-band VHF is now seeing difficulties and they would like to overcome them.

We are close to having a mobile standard that's been created to piggyback on the ATSC signal. Is that going to work on the VHF channels?

It's going to have similar problems. With UHF the wavelengths are actually much smaller. Something like this [holds up a Blackberry] has an antenna that operates at 2 Ghz so the antenna's fairly small. At VHF frequencies, your antenna's got to be a quarter wave length. The middle of the band is about 15 inches. How do you fit that 15-inch antenna into here? That's part of the problem with using VHF for mobile. But I understand from some of my clients that they've seen demonstrations on mobile where it works just fine at V. I don't know how much of a problem it is. I'm only getting anecdotal information from clients.

Assuming that VHF mobile reception is a problem, how would you fix it?

Adding more power might be the answer. I don't know. More efficient antennas in the handheld devices might be the answer. You may have to put amplified antennas in there and then, of course, you have the inherent noise problems. So it's a multifaceted problem and I don't think that there's an easy answer to it yet.

What about the single-frequency networks and repeater stations. Is that something that broadcasters should be thinking about for VHF mobile broadcasting?

It depends on the terrain in your area. A single-frequency network using a series of smaller transmitters might be an answer. The commission's already authorized that. Given what limited information I have right now, I would like to see some terrain blockage between the main transmitter or central transmitter and some of these outlying transmitters to avoid interference.

Do TV broadcasters still care about their broadcast signals?

That depends on cable penetration. Where there's almost a 100 percent cable penetration I don't think they're so worried. The few off-the-air people that they have, they work with them and get it resolved. But in other areas where there's only 60 to 80 percent cable penetration, it's still important. And some markets where we work don't have direct satellite service yet. DirecTV and Dish

don't carry the local signals.

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