DISRUPTOR

By Patrick Nelson, Network World
JUL 15, 2015 12:55 PM PT

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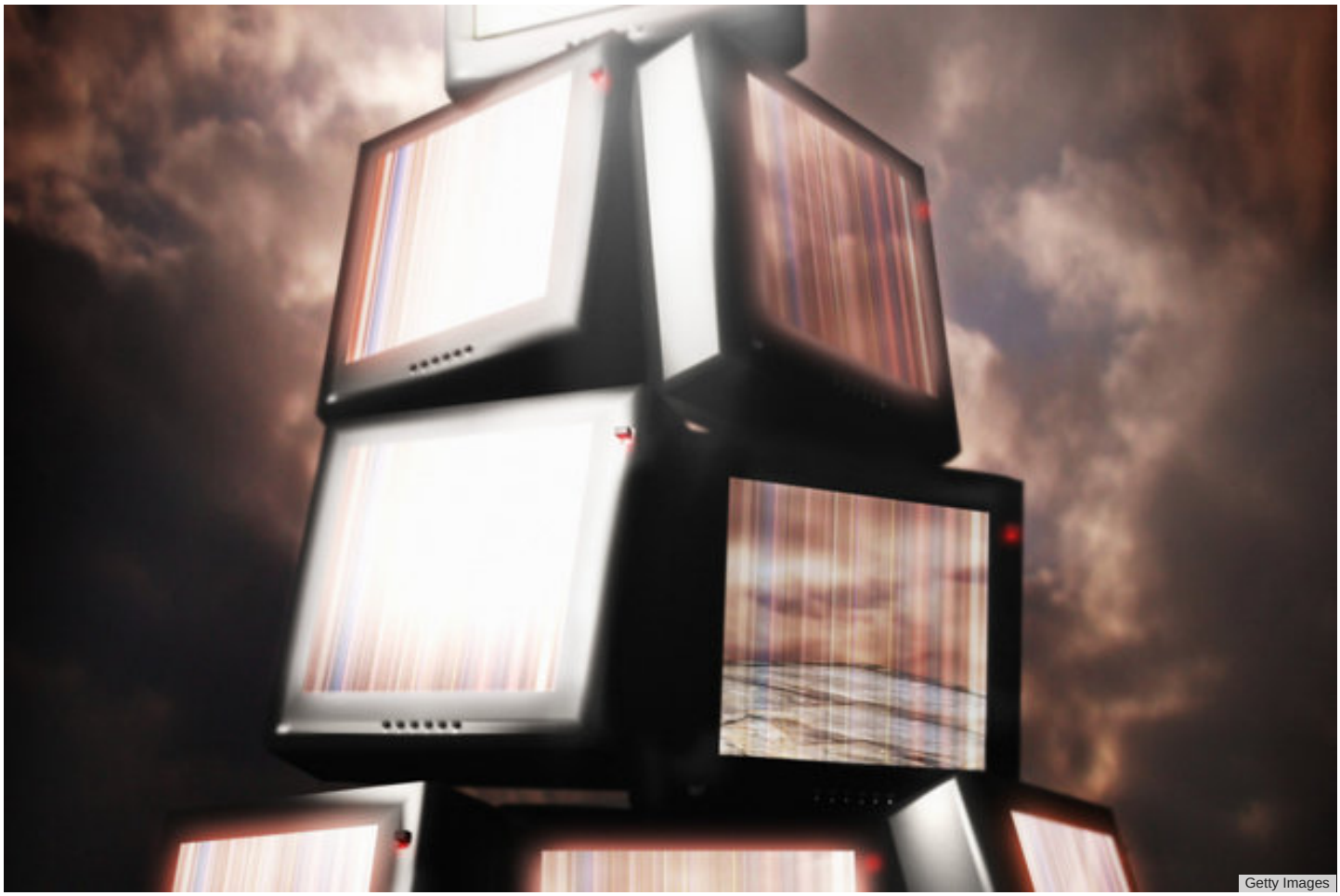
Data transmissions could run in parallel with TV broadcasts on propagation-friendly spectrum, according to scientists.



If you've ever wondered why your Wi-Fi signals are spotty and don't fill buildings adequately, one reason is that the frequencies that are used aren't particularly suited for that purpose. That's despite improving router and antenna design.

Wi-Fi generally uses microwave frequencies, at 2.4 GHz and 5 GHz. Those signals don't travel around or penetrate objects very well.

UHF

Some scientists think that the more substantial, lower-down UHF spectrum, which in this case ranges from 400 MHz to

700 MHz, would be more suitable. Its radio wave is larger so it wraps itself around objects better, for one thing.

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However, it's not as simple as just switching.

That UHF spectrum is used for television broadcasts, and those outfits were there first, so they got to choose the best frequencies. TV companies like those UHF signals for the same reasons we do, plus they travel further with less tweaking than microwave, so it is generally easier to work with.

Signal-cancelling

However, scientists at Rice University Houston say they have found a way to transmit data on those same coveted UHF frequencies without causing interference.

They're doing it using a form of signal canceling that "protects" local TV receivers when they are active, Xu Zhang and Edward W. Knightly say in their paper.

The team's experiments, which it calls WATCH (Wi-Fi in Active TV Channels), enables Wi-Fi transmission in the presence of "kilowatt-scale" TV transmitters, by getting a "smartphone-based TV remote or an Internet-connected TV to inform the WATCH controller of TV receivers' spatial-spectral requirements," they say in the paper.

In other words, the technology identifies exactly what part of the spectrum the receiving TV requires at that time, then it transmits the Wi-Fi over the same spectrum, taking the TV requirement into account.

"It monitors TV broadcasts on a channel and uses signal-canceling techniques to insert wireless data transmissions into the same channel, which eliminates TV broadcasts from interfering with the 'super' Wi-Fi data signals being sent to computer users," Knightly said, according to an article by TVTechnology.

I've written about interference-cancelation in radio before in " Available spectrum could double with self-interference canceling algorithms." This is a similar idea in that it's optimizing spectrum through micro-management-style second-guessing.

Regulators

Regulators have been keen to show fairness over important UHF spectrum. And as such, they are allowing unused UHF spectrum, called White Space, to be re-purposed, as long as it doesn't interfere with existing TV.

Where the Rice University work applies is that its technology functions on the used UHF spectrum rather than the unused part.

It's an important distinction, because although regulators have been freeing up White Space with a kind of analog-to-digital pruning, broadcasting still uses large parts of it. And that's even though huge swaths of the population now get their television via cable, satellite, and Internet.

"Unfortunately, the large number of over-the-air TV broadcasters in many populated areas yields extremely limited White Space availability," the research team says.

"In the U.S., only 7 to 10 percent of all TV households rely on over-the-air UHF broadcast for TV programming," they added, quoting Consumer Electronics Association 2013 figures.

So although UHF isn't used much anymore by consumers, it's not available for newcomers like data, because the broadcasters still have a hold on it and are indeed using it.

But, this way, if the tests work right in the real world, both data and the aging broadcast TV could share the space. Ironically, much of the data is on-demand TV anyway.

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Patrick Nelson was editor and publisher of the music industry trade publication Producer Report and has written for a number of technology blogs. Nelson wrote the cult-classic novel Sprawlism.

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