

There is a way to use dying UHF channels for 'super Wi-Fi' data connections



Eric Mack | July 16th, 2015



2 PICTURES

Rice researchers used WARP, the wireless open-access research platform, to build the system (Credit: Jeff Fitlow/Rice University)

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To say that pulling data out of the air via a Wi-Fi connection is more popular in the United States than pulling down a video signal from a local UHF television station probably won't come as a surprise to most Americans, but use of the UHF spectrum is still prioritized for TV signals. Now researchers at Houston's Rice University have demonstrated how UHF frequencies can be used for so-called "super Wi-Fi" without significantly interfering with legacy TV broadcasts.

"Due to the popularity of cable, satellite and Internet TV, the UHF spectrum is one of the most underutilized portions of the wireless spectrum in the United States," said lead researcher Edward Knightly. "That's a bitter irony because the demand for mobile data services is expected to grow tenfold in the next five years, and the UHF band is perfectly suited for wireless data."

UHF takes up the space between 400 and 700 megahertz on the wireless spectrum. Its signals can carry for miles and more easily penetrate walls and trees than the higher frequencies used for most wireless routers. Despite this and the growing demand for wireless data, TV broadcasters continue to maintain preferential access to the UHF spectrum, even as the percentage of Americans relying on over-the-air signals for TV programming has begun to dip into the single digits in recent years.

The Federal Communications Commission allows for data to be transmitted over open UHF channels not claimed by a TV broadcaster, but urban areas where the need for more Wi-Fi options is greatest are also the least likely to have unclaimed UHF frequencies.

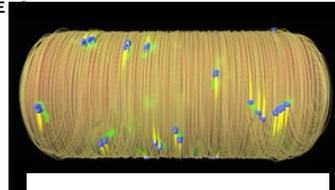
Knightly and Rice graduate student Xu Zhang designed a new solution to allow for transmitting wireless data over UHF channels during TV broadcasts over those same channels called WATCH (for "Wi-Fi in Active TV Channels") and were granted permission from the FCC to test it on the Rice campus last year. The basic idea behind the system is to actively monitor nearby TVs that are tuned into a local UHF video signal and to use advanced and efficient signal-canceling technology to send wireless data



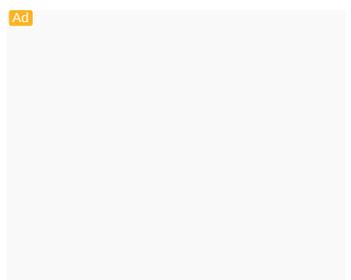
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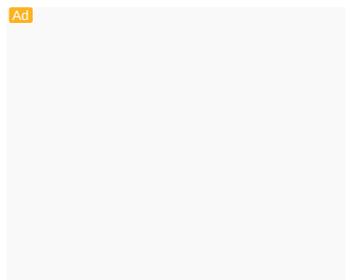
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over the same channel without interference between the data and video transmissions.

Rather than adding new technology to existing UHF TV transmitters, the system relies instead on actual television sets reporting when they are being tuned to a UHF channel via smart TV remotes or possibly through integration in next generation TVs. When a TV tunes itself to a UHF station, the Wi-Fi system then shifts its data transmission to an unused part of the UHF spectrum.

“Our tests showed that WATCH could provide at least six times more wireless data (over existing UHF spectrum),” Knightly said, adding that the system only added a fraction of a second delay to tune a test television equipped with WATCH to a UHF video broadcast, which was practically imperceptible to a person switching channels.

“Allowing the UHF spectrum to be inefficiently used makes little sense today and will make even less sense in the future... There are already more people in the United States who require mobile data services than there are people using broadcast-only TV.”

A [report](#) on the research was presented at Association of Computing Machinery’s MobiHoc 2015 conference in China.

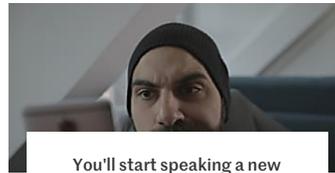
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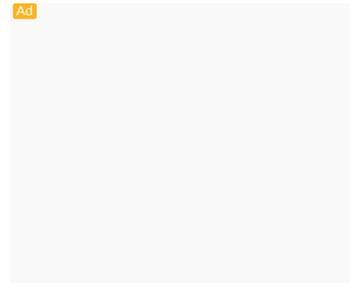
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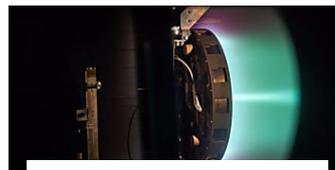
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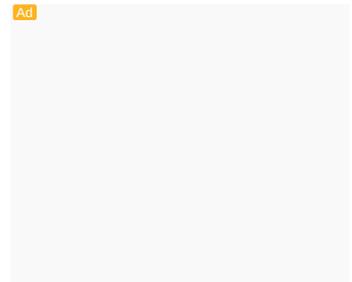
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