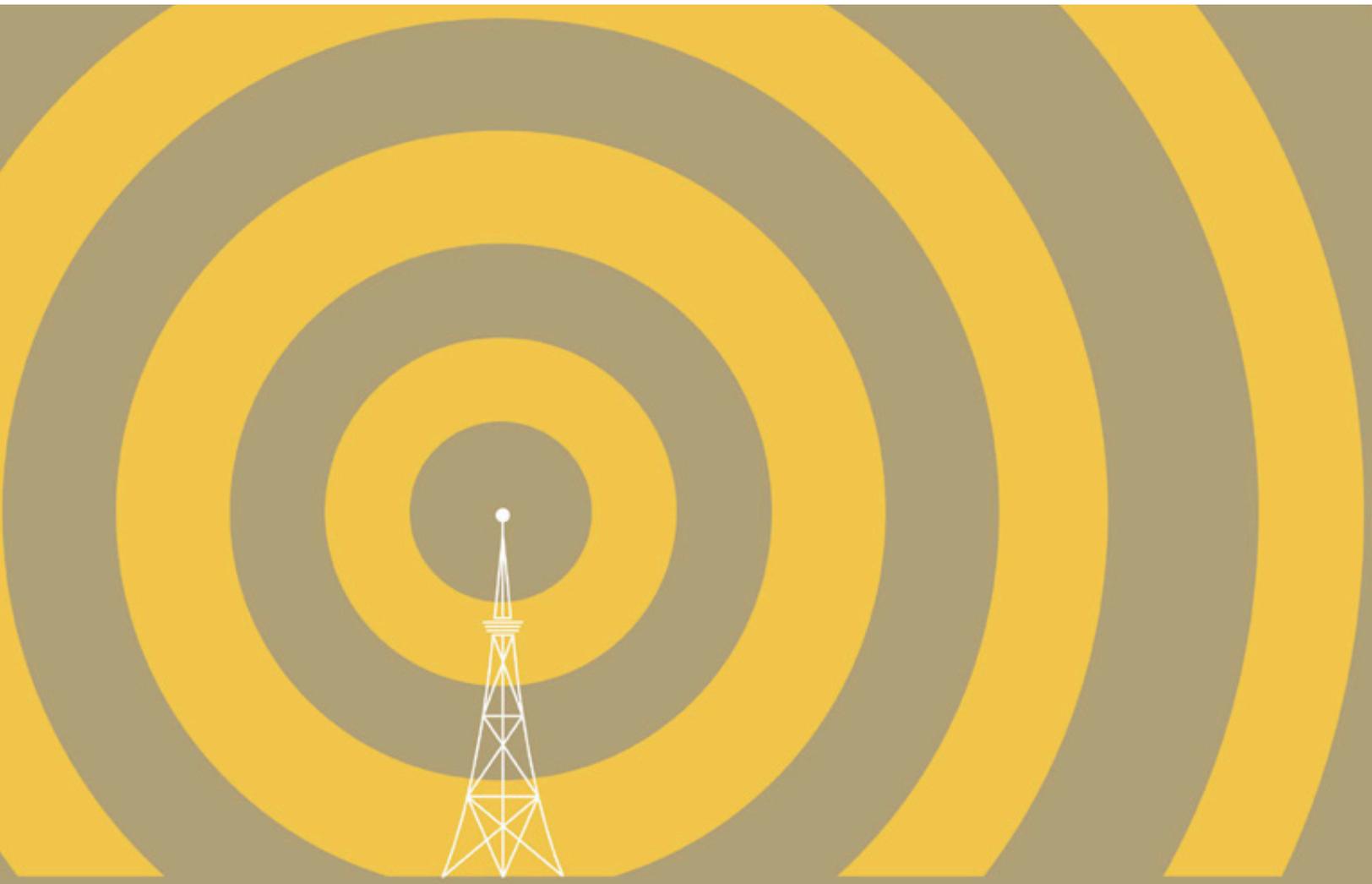


ProSoundWeb EXPERT SERIES



STATE OF THE RF UNION: THE WIRELESS SYSTEM LANDSCAPE IN 2018

Chapter 6 of 6: Wireless Systems Expert Series

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STATE OF THE RF UNION: THE WIRELESS SYSTEM LANDSCAPE IN 2018

By James Stoffo

A little over year ago, the U.S. pro audio industry was anxiously awaiting the impending outcome of the 600 MHz auction. We didn't know much except that RF products operating in the 600 MHz band would likely be phased out over the next three years. When the auction was completed in April 2017, the big winner was T-Mobile, which spent just under \$8 billion for its share of radio spectrum across the country and immediately announced plans to start testing by year's end.

T-Mobile is making good on that promise, currently commencing services in more than 400 counties across the U.S. Once any auction winner begins testing in the 600 MHz spectrum, it becomes illegal to operate wireless microphone, in-ear monitoring, and intercom systems in that cellular block. The fine

for doing so is more than \$12,000 per day (per frequency!).

In discussions with T-Mobile's internal 600 MHz group, we've learned the company is scheduled to commence services in most major markets, including the metropolitan areas, third quarter of 2018. Only one or two of their licensed pair of 5 MHz blocks will be used, with the remaining block pair(s) going live in 2019 after the Institute of Electrical and Electronics Engineers (IEEE) finalizes the 5G Standard. To get the latest T-Mobile deployment information, the company has a website (<https://howmobileworks.com/spectrum>) with a spreadsheet of the current deployment schedule by county, as well as a place to sign up for email notifications.

Because T-Mobile – and any other auction winner for that matter – may test in any block of frequencies above 600 MHz in any open TV channel in the U.S. at any point in time, wireless system users all must assume that open channels above 600 MHz are not usable (unless you know for a fact that an auction winner is not testing).

To simplify what this means: I've done my last show using equipment that operates above 608 MHz, except for the 653-663 MHz duplex gap. If there are no DTV stations in the duplex gap, then we can be assured that those frequencies will remain open for wireless system usage, as long as the specific technical rules for that band are met, until we get a better sense for the RF out of band emissions by the adjacent LTE downlink and uplink.

Further Moves

In addition to auction winners energizing and testing, the great television repack began in earnest in 2018. The Federal Communications Commission (FCC) has a 10-phase plan to move all the UHF TV stations above 600 MHz to below the auctioned spectrum. Most of these TV stations will move to a lower band UHF TV channel. Phase 1 testing begins September 14, 2018 (and concludes November 30).

Out of nearly 2,000 UHF TV stations above 600 MHz, only 13 will be moving to the high VHF band (174-216). However, it's also important to note that in its quest for a fast rollout, T-Mobile, with cash in hand, is actively working with TV stations to move earlier than their phase assignment where possible.

This means that those of us that utilize wireless systems and other RF equipment now have the knowledge to make good purchasing and budgeting decisions for new equipment that will be necessary by the end of 2018.

For most productions, experienced RF event coordinators reserve what little is left of the traditional UHF spectrum for wireless microphones and IEMs. This is primarily due to current manufactured equipment availability, although several companies are making headway in this area. (One entity of note is

DO YOUR HOMEWORK
WHEN MAKING A
PURCHASING DECISION.
KNOW THAT TIME IS
NO LONGER ON OUR SIDE.

Audio-Technica-owned Alteros, which has introduced a wireless microphone system that operates at 6.5 GHz).

As far as communications and IFB equipment is concerned, the use of alternate radio spectrum such as VHF, 900 MHz and/or above 1 GHz has become quite prevalent. These radio bands, most of which are new to the wireless operator, require a bit of a learning curve. Radio waves behave differently in both VHF and high-band UHF, and for some bands, there are some additional regulatory matters to consider.

Setting Priorities

This spectral band planning, a common practice among RF coordinators, was one of the primary considerations in the choice of operating bands for the Radio Active Designs UV-1G wireless intercom, along with significant spectral efficiency. Getting the belt packs transmitters – the largest element of wireless intercom spectrum – out of the way of UHF-centric wireless mics and IEMs was a priority.

The VHF band was chosen for two reasons: No other professional grade audio products were on the market at the time (even today, the only other high VHF pro audio device on the market is the Lectrosonics VHF IFB); and the spectrum is licensed, which means it can be, and generally is, coordinated, with the primary licensee (TV broadcasters) easily identifiable in the FCC database and by actual field strength measurements.

The other key attribute of the UV-1G system is spectral efficiency. With a channel bandwidth as low as 75 kHz, an occupied channel bandwidth of only 30 kHz, and full band tuning range in both the outbound UHF (base TX) and inbound VHF (base RX), the system is over eight times more spectrally efficient than the previous generation of FM based products. Upwards of 30 to 35 belt packs per 6 MHz TV channel has been achieved in high density installations.

Further, because both the base and belt packs can tune the full range, now all belt packs within an overall system can listen to a single base transmit; no more duplicating outbound audio buses due to limited band splits of



The Radio Active Designs UV-1G wireless intercom system.

equipment.

Do your homework when making a purchasing decision. Know that time is no longer on our side. We need to make alternative plans for all equipment operating in 600 MHz by the end of 2018.

James Stoffo is a noted RF consultant and chief technology officer for Radio Active Designs, a developer of wireless intercom systems.

About Radio Active Designs:

Radio Active Designs, formed by a group of top wireless audio specialists, designs and manufactures spectrally efficient (wireless intercom systems) to ensure that all live events, performing arts, and broadcast media may continue to flourish with minimal negative impact from the fallout of the FCC (600 MHz) auction and TV channel repack.

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