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The Devil and the Details

FCC adopts elaborate white space rules

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Thudding a 1.3 pound order on the press table late on a Friday afternoon, the FCC not only ruined a lot of Washington weekends, but ended years of dispute by authorizing unlicensed devices on TV frequencies. A lot of the paper is taken up with the explanations and rationales needed to weatherproof against the inevitable court appeals. But the rules themselves still run to 15 single-spaced pages, making this by far the most complex regime for any unlicensed service.

We have long been doubtful that any workable set of rules could adequately protect TV stations and wireless microphones from interference. Poor device performance in recent engineering tests only deepened our skepticism.

It does not happen often, but we could have been wrong. The FCC may have pulled it off. Sure, there is always room to quibble over the numerical details – more channels for wireless microphones, lower detection thresholds, etc.

But the basic regulatory structure for unlicensed white space usage seems workable on paper. In actual practice, whether the manufacture, marketing, and use of these devices can provide adequate protection for licensed operations remains the big question. We may have to wait a year or two for the answer.

A rulemaking like this one – dropping new users into an occupied band – always involves a delicate trade-off between power and flexibility for the newcomer, on the one hand, *versus* protection for the incumbent, on the other. Here, having made the decision to allow the devices at all, the FCC seems to have resolved most doubts – and there are a lot of them – in favor of the incumbents – and there are a lot of them, too. The new rules protect:

- < TV service (full-power digital, Class A and low power digital and analog, translators, boosters);
- < Wireless microphones (and other low-power auxiliary devices);

- < Two-way radio on channels 14-20 in thirteen major markets;
- < TV translator receive sites;
- < Cable headends;
- < Broadcast Auxiliary Service fixed links;
- < Offshore Radiotelephone Service;
- < Canadian and Mexican border areas;
- < Radio astronomy and medical telemetry (TV channel 37); and
- < Radio astronomy sites (all channels).

Riding herd on potential interference to that many services necessarily puts a lot of constraints on TV band devices (TVBDs), as unlicensed white space gizmos are now known. The constraints are mainly of three kinds:

- ① Operation is flatly prohibited on certain channels, and in certain areas, and on some channels in some areas.
- ① Every TVBD must know where it is, and have a current list of open channels for that location, or else it must operate under the direct control of a TVBD having that information. (Manufacturers can bypass this rule by undertaking extra procedures; *see* below).
- ① Every TVBD must sense the spectrum for incumbents on the channel it is using.

The details are stringent. Device locations, for example, must be determined to within 50 meters, a requirement that only GPS can fulfill today. The catalog of available channels must be updated at least daily. Sensing must achieve a detection level of -114 dBm, equivalent to 0.004 trillionths of a watt – yet even this sensitivity could miss TV signals that are viewable with a good outdoor antenna.

Looking ahead, TVBD manufacturers may want to avoid the self-location requirement, and instead seek to protect incumbent services solely through sensing. Those products might work better inside buildings, where GPS does not penetrate well, and in less populated areas, where control signals from companion GPS-based devices might be hard

to find. Unfortunately, it those were just the types of sensing-only devices that fared the worst in testing. The FCC is willing to allow them, but not until it is satisfied they can meet requirements that have eluded them so far.

Ordinarily, FCC product certification is a private matter between the manufacturer and the FCC engineers. But this is not an ordinary rulemaking. Most FCC technical rules make it a straightforward matter to determine whether a candidate device complies. Here, though, being sensitive to the starkly differing interpretations that TVBD advocates and their opponents have put on past sensing-only test data, the FCC is adding extraordinary steps to the certification process. Rather than simply trust the applicant's own test results, the FCC will re-run the tests itself, not only in the laboratory, but also in the field. The testing will be open to the public. And the FCC will put the test results on public notice and invite comment. Any sensing-only devices that reach the market will have overcome unprecedented scrutiny.

The last two proceedings for new, unlicensed services – ultra-wideband and broadband over power line – prevailed at the FCC despite vehement opposition. But both fell short of expectations in the marketplace. Because TVBDs are closer to existing successful products, such as Wi-Fi, they may have an easier route to breaking that pattern. On the other hand, the FCC has set up formidable engineering challenges that are sure to appear in the price tag.

The TVBD advocates have what they asked for. Let's see what they can do with it.