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The spectrum management newsletter

Spectrum sharing won't happen without strong regulatory push

The "project of increasing the effectiveness of our use of spectrum by sharing is still not so much in the foothills, but with the foothills still in fairly distant view," Martin Cave and William Webb said in a paper published this month.
Oct 30, 2017 by Dugie Standeford

Bands: 3.5 GHz Tags: 3.5 GHz, spectrum sharing, white space

Despite moves towards sharing in the 3.5 GHz Citizens Broadband Radio Service (CBRS) and TV white spaces (TVWS), nothing much has changed in the past five years, nor will it without leadership from spectrum regulators, the authors say.

> "Sharing is 'insufficiently in the interests of the organisations which control the spectrum' and regulators aren't proactive enough"

While Dynamic Spectrum Alliance (DSA) President Kalpak Gude agrees on the need for more government involvement, he believes the authors are too pessimistic about CBRS and TVWS rollout.

Unfinished business

Spectrum sharing remains unfinished business, the authors wrote in the paper, entitled *Why has spectrum sharing been so hard to accomplish?* Regulatory economist Cave is a visiting professor at Imperial College Business School while telecoms consultant Webb is director of Webb Search.

One reason for the lag is that the momentum of spectrum user rights (defined as a limit on the interference that can be expected from others in the same and neighbouring bands) as the primary way of controlling interference "appears to have faltered".

The traditional method of apparatus licensing has survived from the era of predominantly exclusive access to licensed spectrum and is likely to form the backdrop to the development of sharing. The other lesson derived from the past five years is that legacy commercial and public spectrum users continue to object to sharing.

For these and other reasons, spectrum sharing, "at least in its early stages when legacy rights seem to be threatened and apprehension is at its height, requires significant leadership and incubation by the spectrum regulator". At this point, the authors said, the best approach may not be to set general or universal rules for sharing but to back commercially viable sharing outcomes in selected cases.

Can the market resolve sharing issues? There are potentially two solutions, the authors said. In one, a single licensee is allocated full access rights to all the spectrum within given geographical and band limits, subject to restrictions on emissions at the boundaries. Here, the regulator could simply authorise trading of "sliced and diced" access rights within the licence and collect information from participants in sharing contracts sufficient to enforce the rights of adjacent users outside the sharing arrangements.

Under a second option, the licensee is assigned an apparatus licence that does not fully exhaust the potential of the spectrum, allowing the issuance of an overlay licence which entitles the licensee to use any spectrum not being used by the incumbent.

"This is an area where there is a lot of scope for learning by doing, with the result that no-one wants to lead, but prefers to be a 'fast follower'," the paper said. There is an argument for either subsidising sharing experiments or for regulators to get involved directly by brokering sharing arrangements, but the situation is "becalmed" at the moment because of the imbalance between the very high "first copy costs" of a sharing arrangement and the incentives for commercial or public sector spectrum users to get involved.

Sharing has become widespread in some bands, such as 2.4 GHz, for physical and historical reasons, the paper noted. TVWS spectrum appeared suitable for sharing because the opportunity could be clearly defined in the spectrum, but nearly a decade on, there has been very little shared use and TVWS "is broadly seen as a failure".

This is due to various problems, including Europe's decision to clear the 700 MHz band, reducing the white space significantly; the uncertainty around the future demands of programme-making and special events users; and the fact that the delay in making TVWS available caused some start-ups seeking to use it to run out of funding. But TVWS left an important legacy — the development and validation of the concept of using a dynamic database to provide spectrum access.

CBRS, which creates three tiers of shared access, is still under debate, the paper said. There are high levels of enthusiasm within the industry about the band, but that was also true for TVWS at this stage in the proceedings. CBRS has been given momentum by the fact that its bands have become the major 5G bands elsewhere in the world, ensuring good equipment availability. But even if CBRS succeeds, it may remain a US initiative since the bands have already been cleared for auction in many countries.

> "The paper is 'unduly harsh' in suggesting that we've reached the end of TVWS"

While in principle the idea of sharing is a good one, sharing is "insufficiently in the interests of the organisations which control the spectrum" and regulators aren't proactive enough in supporting new approaches or new entrants, the paper said. The best way forward could be some successful case studies of commercial applications that could demonstrate the potential and identify the risks and details. Once there are successful examples of sharing, regulatory support could probably be relaxed. Regulators may not be comfortable with this sort of intervention but without it, "it is hard to see any change in the current levels of sharing".

Accurate but pessimistic

Spectrum sharing is "very much the future of spectrum management," the DSA's Gude told us. He acknowledged that the paper presents an accurate snapshot of the current situation, but said there's "so much energy" around CBRS that it is hard to be negative about it. Given the number of players involved in CBRS and the energy around it, "success is more likely than not".

The paper is "unduly harsh" in suggesting that we've reached the end of TVWS, Gude said. TV white space has experienced "headwinds" due to the 600 MHz incentive auction, which created regulatory uncertainties, but it should not be judged until TV channels are repacked and other issues are resolved, he said.

Colombia this year instituted TVWS rules, South Korea and South Africa are about to do so, and India and China are looking at TVWS — all this with the understanding that use of the spectrum hasn't been as successful as hoped so far. The fight to make TVWS available is "not over by a long shot".

Many factors have changed that will make dynamic sharing a more needed technology, Gude said. For example, in spectrum above 3 GHz and 5 GHz, exclusive licensing becomes more wasteful because signals can't enter buildings as easily, so the idea of carriers being the only infrastructure deployers is beginning to run into reality. At the same time, carriers' business models are changing as they look to unlimited data models to drive their businesses. Under those models, there is a break between capacity-building on a network and on revenues, yet customer demand continues to grow. This drives the move toward unlicensed spectrum, which becomes almost necessary to infrastructure build-out, while dynamic sharing becomes more valuable in the context of spectrum sharing as moving incumbents proves harder.

Gude agreed there must be regulatory structures to enable dynamic sharing because the market will not enable this without some government involvement. If he disagrees at all with Cave and Webb, it's with their characterisations of TVWS and CBRS, he told us: a little negative in one case and not positive enough in the other.•

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