FIERCE Wireless

No magic spectrum sharing solutions - Industry Voices: Rysavy

by Peter Rysavy | Apr 6, 2021

In February 2021, the Department of Defense (DoD) **released the responses** to a request for information (RFI) on dynamic spectrum sharing that it had issued in October 2020. The RFI asked specific questions about how dynamic spectrum sharing (DSS) between industry and DoD might operate in the future. The frequency range DoD targeted, 3100–3550 MHz, comprises critical mid-band frequencies for expansion of 5G networks. The responses are informative and provide a crystal ball for spectrum policy for the rest of the decade.

The RFI caused some confusion because the term "DSS" already refers to a specific 5G capability by which LTE and 5G devices can share the same radio channel. Instead, DoD was applying the term more generally along the lines of Dynamic Spectrum Access (DSA).

A subset of the spectrum DoD was assessing, 3450–3550 MHz, is already in an **FCC proceeding**. On **March 17, the FCC voted to proceed with an auction in October of this year**. The rules it adopted make the band similar to C-band, with the same full-power operation, and the same Partial Economic Areas (PEAs) for licensing. Spectrum blocks, though, will be 10 MHz versus 20 MHz in C-band to encourage competition.

Most significantly, the band does not mandate a spectrum access system (SAS) as used in the neighboring CBRS band (3550–3700 MHz). Because federal incumbents will continue using the 3450–3550 MHz band in specific geographic areas, the rules will require coordination between commercial operators and these incumbents.

Together, the FCC plan and the DoD responses demonstrate that dynamic spectrum sharing (as envisioned by DoD) is not a realistic option for widespread 5G commercial networks. The FCC states in its order, "Permitting licensed-by-rule operations would require implementing coordination mechanisms similar to the Spectrum Access Systems found in the Citizens Broadband Radio Service, thereby adding complexity to this band not otherwise required."

Even for the near future, the DoD RFI responses yielded no magic spectrum sharing solutions. The RFI suggested that DoD is seeking solutions beyond the types of approaches available today, such as **CBRS**. No response detailed a technology that would facilitate spectrum sharing between different types of systems, such as 5G and military systems. For example, one suggestion was for an enhanced CBRS architecture with a DoD-controlled SAS that operates in near-real-time, but such an approach would take years to develop.

What could happen in a shorter timeframe is an enhancement to CBRS, called the Incumbent Informing Capability (IIC). The National Telecommunications and Information Administration (NTIA), which manages the federal government's use of spectrum, along with DoD **have proposed IIC** as a mechanism by which DoD and other federal spectrum users could inform commercial stakeholders about their planned use of certain frequencies. For example, if Navy radar on a ship were to be operational near a specific city on a specific day, the IIC would inform cellular operators to not use affected frequencies for a specific time period. The IIC could replace the Environmental Sensing Capability (ESC) in CBRS.

Industry generally supports the IIC concept, particularly because it could be more effective than the ESC, eliminating some ESC problems, such as radio interference between CBRS deployments and ESC sensors. Again, however, IIC, will take significant time to specify, design and develop.

IIC also poses some inherent problems. For example, military incumbents, not wishing to advertise their movements, might obfuscate their operations by retaining more spectrum over larger areas than they actually need. In CBRS, IIC would interface with the Spectrum Access System (SAS) databases. In theory, the IIC could also interface directly with operator networks in an architecture that does not use CBRS.

Interestingly, the DoD RFI also asked about how DoD could share frequencies it currently controls with commercial 5G networks, in combination with a private 5G network to support its own operations. Here, respondents pointed to a wide range of available technology building blocks, including virtualization, network slicing, Open RAN, RAN sharing, multi-access edge computing, and micro-segmentation. With these, a commercial operator could partner with DoD to provide 5G service, using a combination of commercial and DoD spectrum. For example, with network slicing, an operator could provide a portion of its network capacity customized for DoD with appropriate quality-of-service and security features. For DoD applications, the network slice would function as a private network.

Multiple DoD RFI respondents, **including Google**, also advocated a FirstNet model, by which DoD could have a secure 5G network for its own operations, using both commercial and DoD spectrum, while making the DoD spectrum — for instance, 3100–3450 MHz — available for commercial networks.

Bottom line, solutions exist by which industry and government can collaborate for 5G networks that share frequencies currently used by DoD to provide DoD a secure 5G network and to make these frequencies available for commercial networks. In contrast, as discussed, no solutions exist for dynamic sharing between commercial and military systems. To develop these currently unavailable technologies, industry and government need to do more experimentation. For example, in October 2020, **DoD announced $600 million** for 5G experimentation and testing at five installations. The National Science Foundation also has a **Spectrum Innovation Initiative** studying spectrum sharing.

Looking at the rest of the decade, AI will be increasingly used in wireless networks, including 5G, for a multitude of purposes, including augmented security, best real-time allocation of radio resources, intelligent edge services, and fault mitigation. The Open RAN architecture facilitates AI integration by having well-defined interfaces for management functions.

Future wireless networks, such as 6G, will also implement AI, so that lower-level radio functions, such as packet scheduling, can take into account a vast amount of real-time information about the network and users. In 6G, **AI capability could be implemented in the scheduler** to facilitate implementation of dynamic spectrum sharing and to begin to realize the vision of true cognitive radios.

Cellular generations operate on a 10-year cycle, with the first third of the time spent on research, the next third on defining requirements, and the final third on developing detailed specifications for actual deployment. We are now in the first third of that 10-year cycle for 6G — a perfect time to perform the research that could result in advanced spectrum sharing defined directly within the standard.

In the meantime, the FCC wisely decided that for 3.45–3.55 GHz, cleared spectrum with minimal coordination is the best option for wide-scale, supercharged 5G networks. These will allow the United States to remain competitive with the rest of the world — a world in which no other country is slowing down its 5G deployment with futuristic dynamic spectrum sharing solutions.

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