A Mid-Band Spectrum Win in the Making

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Anyone who has spent half a minute working on wireless communications issues knows that America's wireless providers need additional spectrum to expand existing network capacity and/or deploy new technologies (e.g., 5G). [1] Such constraints apply to both licensed and unlicensed spectrum users. While spectrum isn't necessarily finite, current technical limitations make it so. This means that there is constant and appropriate pressure on the FCC to identify underutilized spectrum bands and reallocate them for new commercial purposes.

Next generation wireless networks will require high, mid and low band spectrum. While the Commission has taken steps to provide high and low band resources, more attention needs to be paid to the mid bands.[2] So, when presented with a viable proposal that would free spectrum for licensed *and* unlicensed purposes while protecting or accommodating incumbent licensees, the Commission should grab it with both hands and rejoice. That exact scenario presents itself in the 3.7 to 4.2 GHz and 6 GHz bands.

Although others (https://ecfsapi.fcc.gov/file/1062353270786/17062202-1.pdf) have ideas on what to do with these particular bands, I believe the best option would be to pursue a proposal put forth by a large, ad hoc coalition of equipment manufacturers, wireless providers, and unlicensed users. They recommend that the FCC allocate spectrum now used for satellite C-Band downlinks (3.7 to 4.2 GHz) for licensed mobile communications and designate 6 GHz spectrum (5.925 to 7.125), which includes the C-Band uplink, for unlicensed use. In total, the proposal would free up 1700 megahertz of spectrum, 500 megahertz for licensed and up to 1.2 gigahertz for unlicensed purposes.

Under the coalition proposal, existing licensees would either be protected or otherwise accommodated. For example, the fixed service users in the 6 GHz band would be protected by unlicensed users and could expand their usage. The Commission will have the opportunity to consider the best means to protect incumbents as part of any proceeding. Additionally, the Commission can also consider ways in which certain incumbents can be compensated to leave these bands.

One element that makes this idea so attractive is that satellite services in the 3.7 to 4.2 GHz band are a bit past their prime. Gone are the days when hundreds of thousands of six-foot dishes (affectionately referred to as large bird baths) dotted the landscape, serving residents with video services. Subscribers have replaced these dishes with smaller ones (e.g., Dish and DIRECTV) or broadband services delivered via wireless or wireline networks. What remains is a total of approximately 1500 unique commercial C-Band earth station licensees, which is quite small in the grand scheme of things, serviced by SES, INTELSAT and a few others. The current licensee with the most earth stations by far is the Associated Press, which uses its dishes to transmit news programming between points, followed far behind by Alaska telecom companies and various cable providers.

Accommodating incumbent licensees should not be that difficult. For instance, the Commission has facilitated the repurposing of spectrum by giving licensees additional flexibility, such as the point-to-point licensees at 28 and 39 GHz. Similarly, Federal government users were given incentives to exit bands to permit AWS. Another recent example is the broadcast spectrum incentive auction. In the case of the 3.7 to 4.2 GHz licensees, it's easy to imagine that a suitable market-based arrangement could be fashioned. To the extent that can't be achieved, the Commission could adopt innovative sharing techniques and very narrow protection zones for *legitimate* C-Band earth stations or fixed links in operation. Such protection zones would only be as large as is needed to ensure that there is no actual harmful interference to the incumbent. On that point, it seems that a good number of earth stations are only on paper. Perhaps, as many as thirty percent simply don't exist or are no longer functional. The Commission also has experience when it comes to fostering spectrum sharing, which will facilitate the protection of fixed point-to-point wireless services. It is also possible that future 3.7-4.2 GHz licensees may want to enter into deals to clear the terrestrial incumbents.

Likewise, U.S. Federal government C-Band users, which we know there are some, should not be a big obstacle either. Specifically, the National Telecommunications and Information Administration's Federal Government Spectrum Compendium (https://www.ntia.doc.gov/files/ntia/publications/compendium/3700.00-4200.00_01DEC15.pdf) indicates that Federal Government agencies maintain C-Band earth stations "in support of voice, data, and video transmissions used in conjunction with commercial geostationary satellites." The fact that there are no proprietary Federal government systems decreases the complexity of the overall proposal by multiple factors. While the exact number of earth stations is not public, they should be able to be addressed in a similar manner as private sector stations, either via market-based mechanisms or narrow protection zones.

Utilizing this spectrum would help the Commission meet the insatiable growth of wireless services. Study after study has shown that the U.S. is going to need multiple gigahertz of licensed and unlicensed spectrum just to keep up with current growth patterns. Consider that wireless data services are expected (http://www.cisco.com/assets/sol/sp/vni/forecast_highlights_mobile/index.html#~Country) to increase 500 percent over the next four-plus years and mobile connected devices are predicted to more than double to one billion over the same time period. Additionally, adopting this idea would continue the Commission's efforts to make available diverse bands. Here, we would be adding mid-band spectrum that many consider to be a crucial addition to the existing resources in low-band spectrum and the Commission's new mobile allocations in the millimeter wave bands.

These particular bands would be highly complementary to other Commission allocations and potential actions. For licensed services, the 3.7 to 4.2 GHz band is near the seventy megahertz of spectrum set aside for Priority Access Licenses, or PALS, as part of the "Citizens Broadband Radio Services," which the Commission established in 2016. Since improving the PALS to make them more functional and usable is already in the works, adding a neighboring band of additional licensed spectrum would allow wireless providers to take advantage of economies of scale and deploy services cheaper and easier. Similarly, reallocating the 6 GHz band for unlicensed services would provide spectrum adjacent to the unlicensed operations that dominate the 5 GHz band, especially since there is a good chance the

Commission will open the 5.9 GHz band for sharing between auto safety systems and unlicensed services. And, adding more than 500 megahertz to the overall unlicensed portfolio would permit super-wide channels and gigabit speeds.

Equally important, reallocating the 3.7 to 4.2 GHz band would complement efforts occurring in a number of other countries, thus helping to preserve U.S. wireless leadership throughout the globe. Initiatives are being pushed in certain European and Asian nations, including China, South Korea, Germany, Japan and others, to open frequencies in the 3 to 4 GHz range for mobile services. In my many conversations at the Mobile World Congress this February and in meetings since it is clear that these countries view the 3.7 to 4.2 GHz as prime spectrum for mid-band 5G wireless service and plan to move ahead aggressively to allocate it for mobile services. Importantly, it should be economically feasible to develop equipment that will tune over wide frequency ranges, making it possible to achieve "de facto" global or regional spectrum harmonization. By acting expeditiously, the Commission can both enable American companies to lead the world in a new spectrum effort and encourage other countries to move faster, just as the U.S. is doing with millimeter wave bands.

Procedurally, the private sector's concept was not done hastily or developed in a vacuum. It has been a carefully crafted and thoughtful effort, many years in the making. For example, Congress has been considering legislation on point for a few years as evident by a related provision in the MOBILE NOW Act, introduced and being led by Senate Commerce Committee Chairman John Thune. In fact, Chairman Thune wrote (https://www.commerce.senate.gov/public/_cache/files/3cefb171-0d50-4c23-9f31-48942e874cc6/4CAB0C0B754962807BB0C203E951D581.thune-letter-on-mid-band-spectrum.pdf) to the Commission just weeks ago seeking that we move forward with a proceeding to open mid-band spectrum for both licensed and unlicensed networks, including 3.7 GHz and 6 GHz. If anyone was seeking some signal of Congressional direction, it can't be more clear than that.

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The Commission has the chance to reallocate key bands in a way that would provide needed spectrum for both licensed and unlicensed networks without harming incumbent users. Accordingly, we should tee up the private sector idea outlined above in a quick manner -- whether as part of a longer Notice of Inquiry or a separate, more targeted proceeding -- in the very near future. I, for one, believe doing otherwise would put U.S. spectrum leadership in question and threaten the longevity and viability of America's broad wireless community.

[1] I reject the notion that the outcome of the incentive auction proves that demand for spectrum is quite low. In fact, it was the second highest grossing U.S. spectrum auction. While it may have not met some people's expectations, there are multiple reasons why that auction proceeded as it did, including artificial and unhelpful auction rules imposed by the Commission, the timing of the FirstNet contact, and differing spectrum needs of the largest wireless carriers, all of which could have affected auction results.

[2] While mid-band spectrum once referred to bands between 1 GHz and 3 GHz, the term has come to refer to spectrum generally above 1 GHz and below 6 GHz as technology advances have permitted greater mobile use of higher frequency spectrum bands.

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