December 6, 2024

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20054

Via Electronic Filing

Re: **GN Docket No. 17-258, Promoting Investment in the 3550-3700 MHz Band**

Dear Ms. Dortch,

I[1] offer these reply comments to aid the Commission in reaching the proper conclusion in the matter of Promoting Investment in the 3550-3700 MHz Band. The FCC re-opened this issue in an NPRM released on Aug. 16, 2024.

Summary

The most important frequency band class for the 3GPP 5G standard is n77, an internationally harmonized band extending from 3.3 GHz to 4.2 GHz. CBRS is an FCC experiment taking place on 150 MHz ranging from 3.5 to 3.65 MHz. For purposes of experimentation with a relatively novel spectrum sharing discipline unique to the United States, CBRS could use a wide variety of frequency bands outside of n77. The status quo interferes with and complicates the deployment of 5G in the US.

[1] I am an independent network engineering consultant and policy analyst, presently working at High Tech Forum as editor and founder. These remarks are offered in my personal capacity and do not necessarily represent the opinions of any client or sponsor. I have previously offered comment in the "Preserving the Open Internet", "Broadband Industry Practices", and "Restoring Internet Freedom dockets," GN 09-191, WC 07-52, and WC Docket 17-108 respectively, and offered testimony at the FCC En Banc Public Hearing on Broadband Network Management Practices in Cambridge on February 25, 2008 as an invited technical expert. My amicus brief was cited by the DC Circuit in its opinion on the Mozilla challenge to the RIF Order.

My CV is available at https://bennett.com/resume.pdf.

If the FCC had set out to deliberately roadblock 5G, it could not have made a more a more harmful choice than 3.5 GHz for the CBRS experiment. To be clear, the FCC did not go down this road with malicious intent; CBRS is a victim of history and emerging standards outside the FCC's control. At the time that the FCC initially addressed 5G, the millimeter wave (mmWave) band class appeared to be a comfortable home for 5G that was not encumbered by high value incumbents. Unfortunately, the mmWave band didn't live up to expectations in terms of propagation.

While CBRS is still a domestic science project, 5G has emerged as a vital global advance in both mobile and fixed wireless access (FWA) broadband. 5G is so powerful that it represents a competitive entry in the US residential broadband markets that were minimally competitive prior to its inception. The success of 5G FWA has placed a target on 5G as a whole. This turn of events is undesirable.

The FCC has at least two options for continuing the CBRS experiment without hampering the 5G rollout: 1) As AT&T and other filers suggest, CBRS can be relocated to the lower portion of the 3 GHz band; or 2) CBRS can be enhanced to include a new 5G-friendly license class permitting something resembling normal 5G operation in the existing CBRS band in selected areas. The second option is consistent with the over-arching goal of the CBRS experiment, namely examining the value of control systems (the Spectrum Access System) to permit the use of different kinds of licensing disciplines. The essence of CBRS is the SAS, not any particular band class, power limit, or coverage area.

As it presently exists, CBRS has two very different and contradictory goals. On the one hand, it is an experiment in the management of dynamic spectrum licenses and on the other it is a means of protecting federal users, mostly military, who rely on relatively crude systems such as radar from interference with more modern data-oriented systems. The nature of the federal systems requiring protection hampers the goal of achieving dynamic management. CBRS places 100% of the onus of cooperation on the private sector systems and expects absolutely no change in behavior on the federal side.

This is the wrong way to approach the problem. Federal users need to take a more active role in signaling their spectrum needs to private sector users. Instead of relying on the severely dysfunctional Environmental Sensing Capability, federal users should explicitly make their needs known through Incumbent Informing Capability (IIC) or direct notification through the SAS. A successful system of dynamic spectrum rights assignment begins with basic agreement of all parties to cooperate. The federal sector needs to step up and shoulder at least some responsibility to cooperate.

Background

The FCC plays two roles in spectrum assignment: In the first instance it is a regulator, dictating terms and conditions of spectrum use; secondly it is an innovator, creating mechanisms for spectrum assignment and utilization such as spectrum license auctions, licensing by rule, Ultra-Wideband, and CBRS. As a regulator the agency prefers its own creations over those of the private sector. This leads to a certain blindness, as we can see from the self-congratulatory language in the NPRM for this proceeding. The NPRM touts CBRS as “the innovation band” facilitating an "innovative approach to spectrum management" and "innovative sharing" through a "testbed on advanced dynamic spectrum sharing" animated by "the entrepreneurial spirit fostered by the Citizens Broadband Radio Service." The Commission would do well to study the novel and innovative uses of dynamic spectrum sharing developed in the academy and in the private sector that made 5G and Wi-Fi possible before vigorously patting itself on the back.

While the FCC certainly has a claim to being an innovator among regulators, it should not lose sight of the fact that cooperation and coordination are the keys to successful spectrum utilization. All uses of radio frequency spectrum for the purpose of communication involve sharing, all wireless devices are dynamic, and each generation of wireless technology is more sophisticated than its predecessors. This is the normal state of affairs in technology markets and all that regulators can do is modestly speed up or slow down the rate of progress.

We need the FCC to be a neutral arbiter that relies on market signals to inform its preferences for spectrum assignment, management, and sharing models rather than the frustrated entrepreneur who went all-in on UWB and 6 GHz Wi-Fi.

The Military Problem

The United States has the most powerful and lethal fighting force in the world. We pay for our military capability in part by direct funding and in part by allocating enormous spectrum rights to the Pentagon to use at is sees fit. I describe this problem in detail in the blog post in Attachment 1.

To summarize, DoD has invested a great deal in “moon shot” spectrum projects in the past that have yielded poor results. I propose that DoD and the major private sector spectrum innovators develop a much closer working relationship than they’re used to in order to tightly integrated military and commercial needs. It’s likely that many military spectrum applications can piggyback on commercial radio signals. If this is the case, it will be unnecessary for the miliary to require so much exclusive access spectrum.

The Wi-Fi Problem

In addition to nurturing a higher-than-average military spectrum appetite, the US also feeds a very hungry unlicensed sector. While advanced countries such as Japan allocate roughly equal midband spectrum to licensed and unlicensed use, we assign four to seven times as much to unlicensed. This is not good for Wi-Fi, for 5G, or for federal users.

I’ve addressed this issue in an op-ed in Fierce Wireless (*When Wi-Fi doesn’t save the day*)[2] and in a research paper on Wi-Fi, *Lessons from the History of Wi-Fi*.[3] Summarizing, too much midband has been allocated to Wi-Fi in the US while Wi-Fi in the mmWave goes largely unused. Wi-Fi and 5G don’t need to use the same spectrum bands because one is a short range network and the other is long range. This reality also exists in CBRS, where GAA and PAL inhabit the same bands while their use cases have nothing in common.

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[2] Richard Bennett, “Industry Voices: When Wi-Fi Doesn’t Save the Day,” March 19, 2024, https://www.fierce-network.com/tech/op-ed-when-wi-fi-doesnt-save-day.
[3] Richard Bennett, “Lessons from the History of Wi-Fi,” *High Tech Forum* (blog), October 2, 2024, https://hightechforum.org/lessons-from-the-history-of-wi-fi/.

Conclusion

It's much too soon to declare CBRS a success. As it currently stands, CBRS is more like UWB than Wi-Fi. It's likely that database-driven SASes will play a role in the future of spectrum management, but it's unrealistic to believe that a highly functional SAS will be able to overcome poor decision making on the part of spectrum regulators.

Stripped to its essentials, CBRS is little more than a kill switch for federal applications that need access to spectrum only occasionally. That function can be integrated into all spectrum licenses without much drama. The tragedy of CBRS is the belief that this system somehow solves the cooperation problem between federal and non-federal spectrum systems. It emphatically does no such thing. The missing ingredient for spectrum cooperation is human rather than technical. It has to become OK for federal users and their contractors to collaborate with the makers and operators of commercial spectrum systems for mutual benefit.

Many federal procurement practices and rules stand in the way of such collaboration. This issue should command the attention of the FCC, NTIA, and DoD.

Attachment 1

DoD Drags Down the Spectrum Strategy

December 12, 2023

A telecommunications revolution is underway, with wired networks giving way to wireless ones. Wire will not be eliminated, as it has a vital role to play in knitting wireless footprints into a coherent whole. But wireless is ascendant as the technology of choice at the network edge.

This being the case, the right to access radio spectrum is under increasing stress. Every application that seeks to use the wireless edge has to contend with the demands of every other application. Regulators have the unenviable – but vitally important – task of mediating competing demands for spectrum rights. They have precious little sound historical precedent to guide them.

In the US and elsewhere, the spectrum management dilemma is muddied by history. 100 years of spectrum rights assignment to a variety of uses over a multitude of assignment methods and strategies has resulted in a messy and effectively random system rife with interference and inefficiency.

NTIA's National Spectrum Strategy

The US National Spectrum Strategy (NSS), recently published by NTIA, is an attempt to impose some order on this nightmare of a system. This 23-page document grasps dynamism as a compass; it mentions "dynamic spectrum sharing" nine times, "dynamic" 24 times, and "sharing" 37 times. It makes study recommendations for dynamic use of five swathes of spectrum but no assignments.

Its unstated assumption is that dynamic spectrum sharing makes the whole greater than the sum of the parts, thus alleviating the scarcity that bedevils spectrum-dependent use cases. If this approach were fruitful, the hard choices that rob Peter to pay Paul could be circumvented as the pool of available, shareable spectrum would be effectively bottomless.

This is wishful thinking.

A Political Problem

NTIA seems to offer a political solution to problems that appear to be technical and economic in nature, never a wise move. While there is a political dimension to all Washington, DC issues, spectrum stakeholders expected a deeper analysis from an agency noted for its technical prowess.

The NSS echoes the infamous PCAST Report of 2012, "Realizing the Full Potential of Government-Held Spectrum to Spur Economic Growth". The PCAST report, controlled by business leaders seeking defense contracts, assumed that the demand for spectrum rights would outstrip the capacity of the traditional systems of licensing by rule or by auction, so a new approach was needed.

This approach was "new spectrum-sharing technologies" of an unspecified nature. It ultimately gave us CBRS, the controversial and somewhat dysfunctional system that left control over sharing in the hands of government incumbents, chiefly the Pentagon. CBRS is not especially dynamic either.

What is Dynamic Spectrum Sharing Anyway?

The NSS doesn't offer a coherent definition of DSS – the closest it gets is a definition of dynamic spectrum management, to wit:

The U.S. Government also will promote and facilitate the research community's continued exploration of dynamic and secure spectrum sharing to improve coexistence among spectrum utilizing systems (e.g., radar, passive scientific measurements, and wireless broadband communications technologies) and to advance the effectiveness of dynamic spectrum management systems (e.g., Spectrum Access Systems and Automated Frequency Coordination).
This says Dynamic Spectrum Management follows the CBRS model, with a permission database (Spectrum Access System) and some sort of coordination system. That's not the way things work in dynamic commercial systems.

Dynamic Spectrum Sharing in Practice

The major wireless carriers in the US all use DSS in the day-to-day management of their networks to accommodate 4G LTE and 5G New Radio (NR.) Samsung has written a nice white paper on how it works, aptly titled *Technical White Paper: Dynamic Spectrum Sharing*.

…LTE-NR spectrum sharing emerges as a technology that allows service providers to deploy LTE and NR in the same carriers and bands. That is to say, spectrum sharing enables both LTE and NR to be simultaneously deployed and share resources in the carrier, as shown in Figure 2. The time-frequency resources in the carrier are dynamically assigned to either LTE or NR according to their respective traffic demands. This dynamic allocation is known as dynamic spectrum sharing (DSS). In an early NR market, DSS is advantageous in that it allocates only the required amount of time-frequency resources to the few NR users, and reserves the remaining resources for LTE services. Over time, as the number of NR users increases, DSS accordingly allocates the required resources for NR purposes. In turn, this flexible spectrum sharing solution allows for a smooth 5G migration.
So here we have spectrum sharing between 4G/LTE and 5G/NR on a dynamic basis. Instead of dedicating separate radio channels to the two use cases, a single channel is shared in the channel's time domain. This is distinct from exclusive, non-shared use and is also distinct from static resource assignment.

CBRS is Static Sharing

CBRS is a three-tier system in which spectrum either *belongs* to the government incumbent, to a Priority Access License holder, or to the public to use opportunistically (as we use Bluetooth or Wi-Fi.) Allocation by tier is effectively static, apart from the right of the government user to pre-empt the other tiers as it deems fit. Opportunistic sharing is dynamic but it's also very inefficient, leaving half of the spectrum inventory unusable because rights are non-persistent, renegotiated packet by packet.

Apart from the public access GAA license, CBRS is static sharing because the only thing dynamic about it is the use case in which the government overlord is idle and no license has been purchased. Sharing in CBRS thus takes place on a day-by-day basis or inefficiently.

Truly dynamic commercial sharing is only possible because the spectrum resource being shared is managed by a *single control point*. In commercial scenarios, LTE and NR signal their desire for transmission rights to a common spectrum manager who mediates their access on a millisecond-by-millisecond basis. CBRS can't do this because its latency is several orders of magnitude greater than that of a truly dynamic system.

It's About Efficiency

Dynamic spectrum sharing is alluring for two reasons:

1. It promises to make more spectrum available to more use cases by eliminating dead time; and
2. It makes difficult questions about whose use case takes priority over the others moot. Everybody gets what they want!

DSS has the capacity to marginally increase the pool of usable spectrum, but it’s a stretch to imagine that it can solve disputes over spectrum rights once and for all. In its current state it certainly can’t.

NTIA realizes this and therefore advocates for research on more advanced spectrum sharing techniques. That’s about half right because we can share spectrum more effectively; it’s half wrong because the means to do so don’t necessarily come from real-time reallocation.

The Real Problem is Interference

In a perfect world, spectrum users would be able to shape their signals such that they can only be seen and decoded by their intended recipient. We might have a dozen spectrum conversations taking place in one place at one time over one frequency when we can cloak transmissions from random receivers while making them clear to their intended audience.

That sort of perfection will be achievable someday, but not by DSS. Rather, it will come about by signal manipulation. DSS is at most a stopgap that enables more use cases that have the capability to cause interference to be packed into today’s spectrum bands. We need to avoid interference altogether.

The long-term goal of spectrum research is therefore to make DSS unnecessary. But we nevertheless need better ways of implementing it than we currently have. True dynamism is an important short-term goal. NTIA shouldn’t be so enamored with short-term solutions or with non-solutions such as spectrum access systems and automated frequency coordination that it loses sight of the real solution.

The Good News

While the NSS splashes about in the DSS pool, a current of coexistence runs through the document with 11 mentions. The very good central message of the NSS is: “Evolving to a “designed to share whenever feasible” mindset will accelerate efficient and effective use of spectrum for all users.”

This is something we can act on as a nation immediately. While the Strategy pretends that commercial use cases need incentives to use spectrum efficiently and reliably, they already have them in the form of license fees. The commercial sector is not the problem because business has built-in incentives to operate as efficiently as possible.

The sector that gets its spectrum for free is the one that lacks incentives to deploy robust, efficient systems that may well have a higher purchase price than bargain basement models. Spectrum mavens already know that government (esp. Pentagon) procurement practices need drastic reform when the equipment in question uses spectrum.

The Lower 3 GHz Band

The lower 3 GHz band is a stark example of incentives. The private sector wants to use this band for 5G in the US, as it is in 50 other countries. The Pentagon wants to continue using it for military radar, the most primitive use of spectrum in the whole toolkit.

CTIA has done a coexistence study demonstrating that the feasibility of sharing at least part of this band for radar and 5G:

The global communications industry has aligned on the lower portion of the 3 GHz band—3300-3450 MHz—as a core 5G workhorse, providing the capacity needed to connect the industries of the future. Nearly 50 countries are already using full-power 5G networks in the lower 3 GHz band, with even more planning to do so soon. Over 70 countries in total are planning for or using 5G in this band. More than 30 of those countries feature 5G deployments that are successfully coexisting with the same U.S. military radar systems that are used domestically, strongly suggesting that 150 megahertz of full-power, licensed spectrum can be made available from 3.3-3.45 GHz in the U.S. without risking harmful interference to military systems.
For equipment portability and interoperability reasons, it's important to harmonize spectrum assignments globally. But the Pentagon is skeptical of the findings of CTIA, GSMA, CCS Insight, and DLA Piper, separately and *in toto*.

The Pentagon Doesn't Want to Share

The Pentagon study of the band is classified in part, so its reasoning is hard to verify. We do know that Sen. Mike Rounds, the Pentagon ally who was instrumental in ending the FCC's auction authority, has told Axios that the Pentagon doesn't want to play ball.

The NSS and testimony by Administrator Alan Davidson on Tuesday, December 5, 2023 commit to continuing to work with the DoD to free this band for public use, but the issue is unlikely to be resolved for at least two years. The Pentagon hints that interference mitigation, rather than DSS, is the gateway to sharing this band, but NTIA's NSS holds out hope for DSS:

DoD determined that sharing is feasible if certain advanced interference-mitigation features and a coordination framework to facilitate spectrum sharing are put in place. The Departments of Commerce and Defense will co-lead any follow-on studies to the Emerging Mid-band Radar Spectrum Study (EMBRSS) that focus on future use of the 3.1-3.45 GHz band. Additional studies will explore dynamic spectrum sharing and other opportunities for private-sector access in the band, while ensuring DoD and other Federal mission capabilities are preserved, with any necessary changes.
DSS is not going to happen in this band, but we may get a static sharing system that NTIA can characterize as DSS. The Pentagon knows what it has to do because its B-21 Raider has blazed the trail. The new best practices are great, but we have a lot of worst-practice inventory. (Hmm…what can the US do with obsolete warfighting equipment?)

We Have a Long Way to Go

While NTIA is nominally in charge of managing government spectrum, the real decision makers are in the Pentagon. NTIA has identified many of the bands that deserve study, but these studies are worthless if they don't lead to action. The Pentagon's history with radio frequency spectrum doesn't inspire confidence. As we explained in 2020:

DoD has been fascinated with magic radios for a long time. In 1997, it launched the 15 year Joint Tactical Radio System project to create one radio to rule them all. Rather than making radios tailored to applications operating with known parameters on a defined set of frequency bands, JTRS was supposed to be a software-based radio that could be all things to all applications in all terrains.

After pouring $6B into this project, the Pentagon purchased 100,000 JTRS-compliant radios that took ten minutes to boot and could only operate on battery power for 30 minutes. The prototype for JTRS, the 1991 SpeakEasy Multiband Multimode Radio (MBMMR) Program, managed to fill the back of a truck with a single radio, but at least it more or less worked.

The generals wanted to build a Software Defined Radio (SDR), which is fine as far as it goes. But putting ever-changing software in the same old hardware year after year after year is fundamentally at odds with Moore's Law, the thing that ultimately makes software possible.
The Pentagon has invested heavily in moonshot programs like JTRS while ignoring the advances in radio tech that have come out of the private sector. It needs to take a more humble and practical approach.

Hiding in Plain Sight

As we explained in August, the Pentagon does employ a few people who understand its spectrum dilemma deeply, such as Gen. Jeth Rey, the director of the Network Cross-Functional Team at Army Futures Command. Rey realizes that DoD needs to develop the ability to hide its command and control signals inside normal-looking civilian radio traffic.

As the general explains the insight, it's a takeaway from Putin's war on Ukraine:

Because the Department of Defense will never have protected access to the EMS, U.S. adversaries such as Russia, China, and Iran have the capability to detect, restrict, or deny the EMS at the time and place of their choosing. Russia's current use of advanced electronic surveillance to detect, locate, and target Ukraine positions is a clear reminder that detection equals horrific destruction. We must address the U.S.'s ability to hide in plain sight on the battlefield by reducing electromagnetic signature, improving training, and sensing and understanding electronic signals.

It's hard to overstate what a radical departure this insight is from traditional Pentagon spectrum policy. As long as I've been involved in spectrum policy – since 1990 – the Pentagon has insisted that it must have primary rights to spectrum in the US.
When this is the case, the argument for pristine spectrum for training exercises in the US evaporates. The football/military adage that "you fight as you train" doesn't mean training in a spectrum environment utterly unlike the one DoD encounters in battle.

Conclusion

America's spectrum dilemma is largely a consequence of institutional inertia in the Pentagon. While there are forward-thinking savants in DoD from time to time, they don't tend to last.

The Pentagon needs to keep its own spectrum strategy up-to-date, just as its battlefield tactics need to be adjusted to reflect current conditions. For example, the war in Ukraine has demonstrated the supremacy of "hedgehog" tactics and electronic warfare over precision guided artillery:

As for lessons for the future, Petraeus and Roberts believe that generals around the world are busily adjusting their battle plans after studying events in Ukraine. Russia's success in withstanding Ukraine's counteroffensive has, they suggest, led Nato to rethink its strategy in the event of war with Moscow. Nato will be considering a "hedgehog" defensive approach, they believe, assuming that "manoeuvre" — as displayed by the US-led forces in the Gulf war and at the start of the Iraq war — is "extremely difficult" in an age of hyper-accurate drone-guided artillery. China's generals, meanwhile, will see events in Ukraine as a cautionary tale for would-be attackers as they war-game scenarios over Taiwan…

As for the battlefield lessons, Russia's shift to a war of "attrition" is not surprising, Freedman argues, pointing out how regularly that occurs in wars. But when it comes to the importance of leadership he is at one with Petraeus and Roberts: Putin, he concludes, "is left dealing with a catastrophe, for Russia as well as Ukraine, of his making."

What about the future of weaponry? Among the innovations of this war, open-source intelligence from social media and mobile phone data has aided the accuracy of artillery and missiles. Petraeus and Roberts also stress that the conflict has underlined how electronic warfare can defeat precision weaponry, but that this will require "huge and ongoing investment".

The point is well-timed, given the debate in Britain and elsewhere over levels of military spending. The authors believe that defence establishments in the west will need to invest in vast new stocks of arms and ammunition, having been shown how quickly they can run down in a hot war. They will also have to consider more public-private partnerships to fund defence innovation. In particular, they stress the increasingly varied potential of drones, suggesting that their use in Ukraine heralds a revolution that could lead to their being deployed at sea for up to six months, for example.

The Pentagon needs to strive to become a better partner with private sector innovators while revising its spectrum strategy from one of dominance to one of cooperation. This mindset change will enable the US to provide better and more effective radio applications for both the civilian and miliary sectors.

Making that happen may be all the spectrum strategy we need.

Attachment 2

Industry Voices: When Wi-Fi doesn't save the day

By Richard Bennett

Fierce Wireless, Mar 19, 2024

Wi-Fi Forward, Big Cable's lobbying group on spectrum issues, is making breathless claims about my favorite piece of work. The advocates have posted a blog claiming Wi-Fi Saves the Day, Every Day

I didn't see it the day it was posted because a winter storm had knocked out my power, silencing all of my connectivity aside from my phone. For 14 hours my principal form of internet use was chatting and browsing as well as checking the Xcel outage map for information on pending repairs. It was a like a longer-lasting version of the common cable outage.

So the article struck me as supremely ironic.

Wi-Fi is great for connecting things around the home and office to each other, especially battery powered devices, but it can't even connect us to the internet without a great deal of help. Wi-Forward's puffery doesn't help its cause.

Some Wi-Fi background

Nobody loves Wi-Fi more than I do, having consulted with the major player in its creation in the early '90s. My client, Photonics, made Photolink, the first wireless local area network for AppleTalk, the proprietary network that connected early Macs to laser printers.

Photonics was keen to address a larger market with a standards-based upgrade that would work with PCs. As one of the IEEE 802.3 standards engineers who transformed the Ethernet physical layer from a coaxial bus to the now-familiar switch and twisted pair spoke, the project made perfect sense. Going wireless simply meant replacing wired spokes with wireless ones.

Legacy Ethernet had been inspired by the radio-based ALOHA network that provided access to ARPANET across the Hawaiian Islands, so taking Ethernet wireless seemed almost like destiny. Because Wi-Fi is strictly local, we were able to devise both infrared and radio frequency physical layers.

Infrared became something of a joke, but it's coming back. Wi-Fi doesn't even need radio frequency spectrum anymore, and it works quite well on ultra-high frequencies that aren't practical for mobile devices.

Making predictions is hard

Wi-Fi wasn't meant to be the end-all and be-all of networks; it wasn't even intended to be a means of internet access because nobody but academics used the internet in 1990. We apparently suffered from a lack of imagination.

Today's Wi-Fi advocates have the opposite problem, a chronic tendency to present Wi-Fi as the answer to all connectivity questions. We see that playing out in a dangerous way in Washington, D.C., debates over prime spectrum for mobile, residential and industrial applications such as private 5G.

In reality, Wi-Fi is a small part of the larger wireless network ecosystem that is quietly replacing the wire. Cable is fundamentally aware of this, and it correctly sees 5G Fixed Wireless Access (FWA) as an existential threat.

The emerging new normal

For the first time ever, cable internet is facing substantial competition in its core market. Cable bundles are dying out and operators can't charge $30/month for landline phone service any more. While cable has had to contend with patches of fiber since the early aughts, outside the Verizon footprint this hasn't been a major threat.

To the extent that we value wireline broadband, fiber is destined to be the long-term winner, but it's still not available everywhere. Fiber is very capital intensive, and customers are slow to switch from the company they know to a relative unknown barring compelling reasons.

By contrast, fixed wireless is a very easy sell. Most of us already have a mobile plan and we all see ads from our carrier touting free trials for attractively priced residential Internet plans. Adding residential broadband to an existing mobile bundle overcomes the incumbency advantage that plagues fiber-to-the home (FTTH).

Strangling the baby (nightmarish image, sorry!)

FWA dominates net adds for residential broadband. Per Leichtman Research Group: Fixed wireless services accounted for 104% of the total net broadband additions in 2023, compared to 90% of the net adds in 2022, and 20% of the net adds in 2021

Between FTTH with higher ceiling and FWA with lower prices – and no linear TV to fall back on – cable is caught in the pincers. It can't go after fiber because Congress is in love with it, but FWA has a vulnerability: Its future depends on government decisions about spectrum allocation.

Hence, depriving 5G FWA of access to spectrum makes business sense to cable, even if the means of doing so – over-allocating Wi-Fi in the name of a better internet experience – is absurd.

A supremely unbalanced policy

The lack of licensed, full power mid-band spectrum limits the ability of carriers to offer FWA broadband to U.S. consumers. This is great for the cable hegemony, as it makes broadband markets less than fully competitive.

While we currently have decent licensed allocations in the low band and high band, our mid-band position is pathetic. Per Analysis Mason, Japan has already allocated 1,100 MHz of mid band for licensed, full power use while the U.S. has to get by on 450 MHz.

Not only does Japan have 2.5 times as much licensed mid band as the U.S., we have nearly twice as much unlicensed mid band, 1,905 MHz to 1,060 including 80 MHz in the mid band. Unlicensed signals, mainly Wi-Fi and Bluetooth, only need to travel 20 feet to cover the typical home while licensed has to cover the entire nation, both indoors and outdoors. Assigning prime spectrum to a system with Wi-Fi's modest requirements is irrational on its face.

The right track

The ranking members of the Senate Commerce Committee and its internet subcommittee, Senators Ted Cruz and John Thune, and a former chair of the House Internet subcommittee, Senator Marsha Blackburn, have written the Spectrum Pipeline Act of 2024 in order to correct our mismatched spectrum policy. The bill also restores the FCC auction authority that unfortunately lapsed due to Pentagon shenanigans a year ago.

The Commerce Committee will debate this bill on Thursday. Wi-Fi Forward is pressuring Democrats to kill the bill on the basis of shameless claims.

The Commerce Committee shouldn't fall for this misinformation. Over-allocating Wi-Fi while starving FWA is like subsidizing cars in areas that lack roads.

Wi-Fi is doing fine, but the broadband market will erode if the FCC can't auction the mid-band spectrum the U.S. needs.

Richard Bennett is an Ethernet and Wi-Fi pioneer who has worked for leading technology think tanks and the FCC. He publishes High Tech Forum and consults on network policy and engineering.