

Competitive Effects of Fixed Wireless Access on Wireline Broadband Technologies

By Hal Singer & Augustus Urschel¹

Executive Summary

What if wireless operators had the network capacity to offer competitively priced, high-speed home broadband throughout the country? How would consumers benefit from this new alternative to cable broadband? This research paper seeks to answer these questions, presenting original estimates of the likely penetration rate of fixed wireless access (FWA) at different price points and speed combinations in a world absent any capacity constraints. We use these estimates to model the annual savings to both new FWA subscribers as well as remaining wireline broadband customers.

To calculate impacts on consumer behavior, market share, and welfare gains, we conducted a choice-based conjoint (CBC) survey to measure the preferences of existing cable modem subscribers and simulate the market shares of existing broadband and potential FWA packages under different scenarios. In all scenarios—including at current prices or alternative discounted prices, and in markets with only cable or those with a mix of cable and fiber offerings—the introduction of FWA packages yields price reductions and significant consumer welfare gains.

The policy implication is clear: The best and fastest way to increase home broadband competition, which will bring significant consumer savings, is getting more full-power, licensed, mid-band spectrum into the hands of FWA providers. FWA is particularly data-intensive compared to typical mobile use, so additional spectrum is the key policy mechanism to enhance the competition FWA is already bringing to the broadband market.

Overview of Findings and Consumer Impact

Based on our analysis, assuming no capacity constraints, ubiquitous FWA entry into markets where cable is the only existing high-speed broadband option (“cable-only markets”) would:

- Convert 18 percent of cable-only households to FWA.
- Create at least \$369 million in consumer surplus for these switchers per year.
- Lead to a 37 percent reduction in the price of cable modem service.
- Generate at least \$5.7 billion in annual consumer welfare gains for those who remain subscribed to cable modem service owing to these lower long-run prices.

¹ Singer is an economics professor at the University of Utah and managing director at Econ One. Urschel is an economist at Econ One. Funding for this study was made possible by CTIA, the wireless trade association.

Full FWA entry into markets with an existing high-speed wired competitor (“cable/fiber markets”) would:

- Convert 2 percent of households from cable modem to FWA.
- Create \$27 million in consumer surplus for these switchers.
- Lead to a 1.1 percent reduction in the price of cable modem service.
- Generate \$220 million in annual consumer welfare gains for remaining cable subscribers owing to these lower long-run prices.

This analysis relies on samples of unbundled, non-introductory, non-discounted prices of both incumbent and FWA offerings, in order to establish a reliable comparison. It also assumes sufficient capacity to support all potential subscribers with high-speed FWA service.

Evidence shows FWA is already having a strong competitive impact. However, continual FWA growth that brings ever more effective competition requires that providers have sufficient spectrum capacity to satisfy all potential subscribers.² FWA is a particularly data-intensive offering, having to supply high-resolution video for large living room screens rather than just mobile phones, for example. Whether additional full-power, licensed spectrum will be made available for commercial wireless use is currently an actively discussed policy issue, with implications for how broadly FWA will be able to scale and how aggressively it can compete.

Availability of FWA in all current cable broadband markets at current non-discounted prices would make for overall consumer welfare gains and savings of over \$6.3 billion per year. If FWA providers had sufficient capacity to be able to compete even more aggressively, FWA would further drive down cable pricing. Our analysis indicates that FWA offered at discount of \$20 per month less than sampled prices would result in \$8.1 billion in consumer savings. Considering other surpluses, overall consumer benefits under this scenario would increase to \$9.6 billion a year.

Background on Fixed Wireless Inroads to Date

FWA is a “last mile” or “access network” broadband technology that connects a consumer’s home network to a wireless base station, which in turn connects to the broader internet via high-speed fiber-optic lines. However, instead of laying physical cable all the way to each individual household (the “last mile”), FWA uses wireless spectrum to transmit data from a central point to customer premises equipment at subscribers’ homes.

Much like wired networks, FWA data speeds have increased over time. With today’s technology and spectrum availability, download speeds delivered over FWA are generally between 100 and 300 megabits per second (Mbps), with peak speeds of up to 1000 Mbps.

A relatively new version of FWA leverages advances in 5G technology. This access technology, deployed by mobile wireless operators alongside 5G mobile service, is exhibiting strong growth

² *Cable Companies Losing Their Grip on Home Internet Market*, CoBank, Nov. 15, 2022, available at <https://www.globenewswire.com/en/news-release/2022/11/15/2556633/0/en/Cable-Companies-Losing-Their-Grip-on-Home-Internet-Market.html> [hereafter *Losing Their Grip*].

in the marketplace. Recent data indicates 5G FWA accounted for 90 percent of all new broadband subscriptions in 2022, growing at more than quadruple the rate in 2021.³ In May 2022, Wells Fargo issued an equity research note asserting that 5G FWA is a “viable competitive threat, particularly in rural areas,” and “the biggest disrupter” in the broadband marketplace in the near term, projected to capture a full 60 percent of new broadband subscribers through 2024.⁴

Early data indicates that as 5G FWA expands, prices on existing cable modem services must fall in response to the new competition. Part of cable’s response to FWA entails the bundling of mobile plans with their (wireline) broadband products. For example, in mid-2022, Comcast dropped the price of its 300 Mbps internet plan by \$20 per month (for a new price point of \$30 per month) for a two-year contract for Comcast (Xfinity) mobile customers. This suggests that Comcast felt pressure from Verizon’s and T-Mobile’s comparable bundles that include 5G FWA for home internet. These bundles were heavily touted in ad campaigns, featuring information about low prices, ease of installation, and lack of contract requirements for 5G FWA services.⁵

Complicating cable’s response to 5G FWA is the fact that cable is also fending off inroads by fiber-to-the-home offerings. Per Wells Fargo, fiber companies typically undercut cable on price by roughly 20 percent.⁶ In response to fiber entry (and only in these markets), Comcast and Charter dropped their prices for gigabit speeds to \$80 per month—\$29 below Comcast’s and \$35 below Charter’s standard prices—and extended the promotion from one to two years.⁷

Survey Design, Results, and Simulated Market Impacts

Our research seeks to quantify 5G FWA’s effects on consumer welfare for those customers with an existing wireline broadband provider. Our primary research questions are:

1. What percentage of existing cable modem customers would switch if presented with a lower cost fixed wireless alternative?
2. How would the price of existing cable modem services change in response to new FWA competition?
3. What would be the welfare effects for both customers who switch to FWA and those who remain with cable modem services at a lower price point?

³ *About 3,500,000 Added Broadband From Top Providers in 2022*, Leichtman Research Group, Mar. 2 2023, available at <https://www.leichtmanresearch.com/about-3500000-added-broadband-from-top-providers-in-2022/>; See also *LRG: FWA Continues to Displace All Others for Broadband Growth*, Telecompetitor, Nov. 17, 2022, available at <https://www.telecompetitor.com/lrg-fwa-continues-to-displace-all-others-for-broadband-growth/> (showing FWA accounted for 90% of annual broadband net adds, and more than 100% in some recent quarters).

⁴ *Fiber vs. FWA vs. Cable—Let the Games Begin, Cry 'Havoc!' and Let Slip the Dogs of Connectivity*, Wells Fargo, May 19, 2022 [hereafter *Let the Games Begin*].

⁵ T-Mobile, available at <https://www.youtube.com/watch?v=jSO-Whn2sCQ&t=60s>. Verizon, available at <https://www.ispot.tv/ad/bVSL/verizon-5g-super-bowl-2022-cable-guy-featuring-jim-carrey>.

⁶ *Let the Games Begin*, *supra*.

⁷ Hal Singer, *Is Fixed Wireless Ready To Take On Cable? It’s Early, But The Initial Data Seem Promising*, Forbes, July 25, 2022, available at <https://www.forbes.com/sites/halsinger/2022/07/25/is-fixed-wireless-ready-to-take-on-cable-its-early-but-the-initial-data-seem-promising/>.

To answer these questions, we surveyed existing cable modem customers to assess to what extent FWA can substitute for cable service. Relying on our review of available broadband packages, we constructed the survey to measure consumer preferences with regard to commonly advertised attributes: price, connection type, download speed, upload speed, brand, promotional price period, and internet quality.

The survey indicated download speed and monthly price were the most important features for consumers, with download speed being slightly more important. Upload speed was approximately half as important as download speed and monthly price, and the connection type was approximately a third as important as download speed. These results track with our internal expectations, as users typically download more than they upload, and internet users are typically price sensitive.

Using the survey results, we generated utility models to inform simulations of how the entry of FWA would affect market shares and prices. We assessed two types of cable modem markets: cable-only markets and cable/fiber markets.

For each of the two market types, we considered three alternative pricing scenarios. First, we considered FWA's entry at a sample of currently offered unbundled FWA prices, which are typically near the price of cable modem packages at a given download speed. We then considered two scenarios where FWA enters at a \$10 and \$20 per month discount below established prices. These plans simulate potential prices where FWA is able to achieve economies of scale and sufficient capacity to compete aggressively on price. For each scenario considered, we calculated the total improvement in consumer welfare from the competitive entry of FWA.

These simulations show that the entry of FWA generates modest consumer welfare for consumers who switch to FWA, and substantial consumer welfare for those customers who passively benefit from the lower prices caused by the entry of new competitive broadband options. We summarize our findings below.

CONSUMER SURPLUS AND PRICE SAVINGS SUMMARY			
Simulation	Consumer Surplus Created for FWA Switchers (\$Millions)	Price Savings for Remaining Cable Modem Customers (\$Millions)	
Cable Market, Current Prices	\$ 369.2	\$ 5,734.8	
Cable/Fiber Market, Current Prices	\$ 26.7	\$ 218.8	
Total	\$ 395.8	\$ 5,953.6	
Cable Market, \$10 FWA Discount	\$ 602.8	\$ 6,392.2	
Cable/Fiber Market, \$10 FWA Discount	\$ 108.5	\$ 507.8	
Total	\$ 711.3	\$ 6,900.0	

Cable Market, \$20 FWA Discount	\$	1,306.4	\$	7,172.9
Cable/Fiber Market, \$20 FWA Discount	\$	245.6	\$	969.5
Total	\$	1,552.1	\$	8,142.4

Policy Implications

FWA is already bringing real benefits to consumers today as wireless providers roll out service alongside their 5G mobile networks. Its ability to scale up to a wider market, continue future growth, and fully respond to demand, however, is dependent on sufficient capacity being available to provide potential subscribers with a high quality of service. This in turn depends on the amount of licensed spectrum available to a provider in a given area. Thus, there is a direct relationship between spectrum availability (particularly what is known as mid-band spectrum) and the intensity of FWA competition for home broadband.⁸ The most effective way to increase FWA competition and ensure the full promise of expected consumer benefits is by allocating more full-power, licensed, mid-band spectrum for 5G.

One plausible explanation for why FWA providers in the United States have been reluctant to further undercut extant cable pricing is the potential for FWA to approach capacity limitations given the relative dearth of 5G spectrum availability in the United States.⁹ Per CoBank, FWA providers are only offering service where they have sufficient capacity to maintain quality of service for both mobile and fixed subscribers.¹⁰ Because wireless networks are more susceptible to congestion than wired networks and FWA is a relatively data-intensive offering, wireless operators will likely face a critical decision of how broadly to offer FWA and at what price, especially if FWA traffic starts to degrade mobile performance. FWA has the potential to scale and intensify competition for home broadband access, but only if FWA providers can obtain sufficient full-power, licensed spectrum.

As our results indicate, a lower price point for FWA would mean substantial defection from cable to FWA in markets without fiber and more modest substitution in cable-fiber markets. To the extent that FWA suppliers are already capacity constrained, they may be reluctant to compete aggressively on price to draw in greater numbers of subscribers for fear the additional load would mean lower quality of service. As mobile industry representatives have explained, the “FWA business case is highly dependent on the number of connections that can be supported per cell tower,” which in turn depends on “the amount of spectrum that can be deployed on a cell

⁸ Mid-band spectrum blends good signal reach and penetration, with high data throughput rates. Full power mid-band licensed spectrum offers wireless operators the opportunity to maximize the performance of their networks for reliable, robust mobile and FWA service.

⁹ Analysys Mason, Comparison of Total Mobile Spectrum in Different Markets, Sept. 2022, *available at* <https://api.ctia.org/wp-content/uploads/2022/09/Comparison-of-total-mobile-spectrum-28-09-22.pdf> (finding that the United States lags its peers by an average of 378 MHz in mid-band spectrum access).

¹⁰ *Losing Their Grip*, *supra*.

tower.”¹¹ GSMA estimates that an additional 2 GHz of upper mid-band spectrum is needed to sustain FWA delivering a download data rate of 100 Mbps in rural communities in the longer term.¹² The natural policy implication is clear: If the government wants to enhance competition among high-speed broadband providers, the key is getting more full-power licensed mid-band spectrum into the hands of FWA providers.

Cable companies, among other groups, are advocating for more unlicensed spectrum or spectrum otherwise only made available through low-power sharing mechanisms, to support services such as WiFi.¹³ However, spectrum is a limited resource, and unlicensed users already have seven times what licensed users have in the valuable mid-band range.¹⁴ Commercial FWA networks will need additional full-power and licensed spectrum to both support demand and achieve the requisite economies of scale to reduce their incremental costs and thereby permit more aggressive FWA pricing.¹⁵ The results of our study provide one explanation for cable’s advocacy for more unlicensed spectrum and thus implicit resistance to more licensed spectrum: that full FWA penetration into home broadband markets would mean cable margin compression and lost cable modem subscribers. Broadband subscribers, however, would enjoy lower prices and higher savings.

Regulators should take note of these developments. The agencies charged with overseeing competition in these areas, particularly the Federal Communications Commission and the National Telecommunications and Information Administration, should quickly establish a spectrum pipeline that can expand the capacity and reach of mobile broadband networks so that FWA can proliferate and bring even more competition to cable. As demonstrated by the findings above, doing so would help drive down prices, providing much-needed relief for the consumers that are facing other cost of living and inflationary pressures in today’s economic environment.

¹¹ GSM Association, Estimating the Mid-Band Spectrum Needs in the 2025-2030 Time Frame: A Report by Coleago Consulting, at 37, available at <https://www.gsma.com/spectrum/wp-content/uploads/2021/07/Estimating-Mid-Band-Spectrum-Needs.pdf> [hereafter *GSMA Study*].

¹² *Id.* at 38.

¹³ See, e.g., The Future of Using (and Reusing) Spectrum, NCTA, Aug. 2, 2022, available at <https://www.ncta.com/whats-new/the-future-of-using-and-reusing-spectrum> (“The majority of Americans use Wi-Fi to connect these devices, making the role of unlicensed spectrum increasingly vital.”); The Future of Commercial Spectrum: Spectrum and WiFi, NCTA, available at <https://www.ncta.com/positions/spectrum-wifi> (“Unlicensed bands offer the most room to innovate, lowering barriers to entry for new technologies and creating more economic activity and new services.”). WiFi Forward, a group backed by Charter, Comcast, and NCTA, similarly advocates for unlicensed spectrum. See About Page, WiFi Forward, available at <https://wififorward.org/about/#partners>; Unlicensed Spectrum at Work, WiFi Forward, available at <https://wififorward.org/issues/unlicensed-spectrum-at-work/> (“Allowing Wi-Fi and other unlicensed technologies to operate in the 5.9 and 6 GHz bands will contribute \$183 billion to U.S. economy by 2025.”).

¹⁴ Accenture, Spectrum Allocation in the United States, available at <https://newsroom.accenture.com/news/three-mid-band-spectrum-bands-offer-greatest-potential-to-meet-5g-demand-in-the-us-study-finds.htm>.

¹⁵ *GSMA Study*, at 38 (showing that with an additional 2 gigahertz of mid-band spectrum, a FWA supplier could support 540 households per site, compared to just 90 households per site with 400 megahertz of spectrum).