

January 28, 2019

BY ELECTRONIC FILING

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation, Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197*

REDACTED - FOR PUBLIC INSPECTION

Dear Ms. Dortch:

Altice USA, Inc. (“Altice”) hereby supplements its response to the October 4, 2018 General Information and Document Request (“Information Request”) from the Federal Communications Commission (the “Commission”) in the above-captioned proceeding.¹

Pursuant to discussions with Commission staff, all documents, except the Declaration of Michael Cragg and Eliana Garcés (the “Economic Report”), provided in this response to the Information Request are designated “Highly Confidential” per the Protective Order and will be redacted in their entirety from the public version of this filing.² In addition to the Highly Confidential version of the Economic Report being provided to the Secretary’s office, a redacted copy of the Economic Report, labelled “Redacted – For Public Inspection” which will be filed through the Commission’s Electronic Comment Filing System in the above-captioned docket.

Enclosed please find:

- Narrative responses to remaining questions in the Information Request, noting in some instances when questions were previously addressed by Altice.

¹ Letter from Donald D. Stockdale Jr., Chief, Wireless Telecommunications Bureau, to Lee Schroeder, Altice USA, Inc., WT Docket No. 18-197 (Oct. 4, 2018) (“Information Request”).

² Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197, Protective Order, DA 18-624 (WTB June 15, 2018) (“Protective Order”).

- A DVD containing the attached exhibits and additional documents responsive to the Information Request. Each document on the DVD is designated “Highly Confidential” per the Protective Order.

This filing contains information that is “Highly Confidential” pursuant to the Protective Order in WT Docket No. 18-197. Highly confidential information has been denoted with **{{BEGIN HCI END HCI}}**. Pursuant to the procedures established in the Information Request and Protective Order, a copy of the “Highly Confidential” filing, is being provided to the Secretary’s Office. Additionally, two copies of the highly confidential filing are being submitted to Kathy Harris of the Wireless Telecommunications Bureau. A copy of the DVD is also being provided to the Commission’s e-discovery vendor. Finally, a redacted copy of this “Highly Confidential” filing labeled “Redacted – For Public Inspection” will be filed electronically through the Commission’s Electronic Comment Filing System in the above-captioned docket.

Sincerely,

/s/ Jennifer L. Richter
Jennifer L. Richter

Enclosures and Attachments

RESPONSES OF ALTICE USA, INC. TO THE FEDERAL COMMUNICATION COMMISSION'S OCTOBER 4, 2018 INFORMATION AND DOCUMENT REQUEST

Before addressing the Federal Communications Commission's (the "Commission") specific questions contained in the Information Request, Altice USA, Inc. ("Altice") would like to provide context regarding the key benefits and drivers of full-infrastructure Mobile Virtual Network Operators ("iMVNOs"), and the merger-specific threats to Altice, wireless consumers, and the prospects for wireless competition from iMVNOs posed by the proposed merger of Sprint and T-Mobile.

First, iMVNOs are essential to the future of wireless competition. As explained in greater detail herein, and in the Declaration of Michael Cragg and Eliana Garcés (the "Economic Report"), the limited reliance of iMVNOs on Mobile Network Operators ("MNOs"), compared to traditional MVNOs, will generate greater competitive pressures in the wireless market. iMVNOs, such as Altice, will only rely on an MNO for access to spectrum, towers and integrated base stations, and backhaul directly from those base stations to a regional point of interconnection (collectively referred to herein as the Radio Access Network, "the RAN").¹

Second, the success of iMVNOs, together with the benefits they will produce for competition and consumers, is dependent on a competitive wholesale market. A competitive wholesale market requires at least two participants to compete on wholesale offerings. Today, Sprint and T-Mobile are the only two meaningful wholesale players. Standalone Sprint and T-Mobile have the incentive to compete in the wholesale market because they have lower retail market share compared to other MNOs and surplus capacity. The lower retail market share incentivizes each company to make its surplus capacity available to the wholesale market because any given retail customer captured by an MVNO is less likely to be a customer of either company, thereby lowering the lost opportunity "cost" to the MNO of participating in the wholesale market. If the merger is approved, only one participant with higher retail market share, and the corresponding incentive *not* to support the wholesale market due to an increased risk of losing those retail customers will remain, which will destroy wholesale competition. The incentive of the merged entity to withhold wholesale access is particularly powerful with regard to iMVNOs, whose offerings will directly compete with the MNOs, unlike "light" or "white label" MVNOs that do not create competitive pressures and merely resell the MNOs service to niche markets.

However, if the merger is denied, and the current wholesale market is maintained, iMVNOs will have the opportunity to compete for retail market share. Success in gaining retail market share will increase the volume of wholesale traffic from iMVNO providers, and this increased wholesale "tonnage" has the potential to entice all MNOs to engage in the wholesale market. As more wholesale sellers enter the market, competition increases, lowering prices and increasing quality, which results in lower prices and better service for all consumers.

¹ At the regional point of interconnection, Altice takes on management of all traffic.

Third, the iMVNO model is an important on-ramp to the buildout of new facilities-based wireless networks, but the Commission must protect iMVNOs from the harms of the proposed merger if this opportunity is to be realized. Altice can offer competitive wireless service as an iMVNO as it builds out and incorporates its own spectrum into a wireless offering. To be clear, “white label” or “light” MVNOs do not provide facilities-based competition through their own wireless core or wireless spectrum.² They rely on the MNO completely to provide these elements, and they are not looking for an “on-ramp” to offer facilities-based competition in competition with their MNO partners.

Finally, Altice notes for the Commission that support for the wholesale market, as requested by a number of petitioners in the merger docket, is necessary, but it is not the only protection needed by iMVNOs. In addition to support for the wholesale market, there are longer-term technical issues controlled by the MNOs (such as wireless network interfaces) that will require the attention of the Commission in the future to ensure that new facilities-based wireless competition emerges.

- 1. Provide documents sufficient to show the following:**
 - a. the customers of the Company’s mobile wireless service, including, but not limited to, the characteristics of customers and the mobile wireless service providers customers could have switched from previously;**

Altice has not yet launched its mobile product and therefore currently has no mobile wireless customers. Altice expects to launch its mobile product in Q3 2019.

- b. the engineering of the Company’s cable wireless networks, including, but not limited to, Wi-Fi handoffs with the Company’s fixed network and the mobile wireless network the Company uses;**

Altice provides herein at Exhibit 2 a description of the engineering of the Company’s cable wireless network. As Altice noted in prior submissions in this proceeding, Altice’s iMVNO model is unique in the U.S. market at this time from a network engineering perspective. The iMVNO model has the potential to *increase* sustainable competition in the wireless marketplace *if* a competitive wholesale market is maintained.

Altice’s entry as an iMVNO is facilitated by its operation of a dense, fiber-rich, fixed network within its footprint and has the necessary interconnection arrangements that allows it to efficiently move all types of traffic nationally and internationally. Altice will use its own fixed network and mobile core to supply all other aspects of the mobile offering, including the SIM, roaming and network partners, data and Internet access, voice messaging, rate charging, customer care, and billing (the foregoing is referred to collectively herein and in the Declaration of Michael Cragg and Eliana Garcés as “core control”).³ This essential set of assets affords Altice the independence necessary to bring true price and product competition to MNOs, benefiting retail consumers. The only asset that Altice requires from an MNO is the RAN.

² “Light” and “white label” MVNOs are MVNOs that simply resells an MNO’s service end to end.

³ See Exhibit 1 at 5.

Because it will be able to exercise “core control” over a wireless service offering, Altice’s iMVNO will be able to offer the full range of competition to the MNOs – competing on price, product value, quality, and product innovation. Altice will be able to innovate and provide new services, without waiting or relying on the MNOs, leading to greater innovation at a faster pace. Ultimately, this innovation will create differentiated products that provide consumers with greater choice and create pressure on the MNOs to innovate themselves to keep up. Additionally, Altice’s iMVNO will be able to manage the costs of its mobile service more effectively than a “light” or “white label” MVNO by using its own infrastructure for backhaul, routing traffic and offloading traffic from the RAN of its MNO partners onto its own WiFi network, or potentially its own spectrum.⁴ Only iMVNOs have the capability to integrate licensed spectrum resources from multiple networks, which can include spectrum from multiple MNOs or an iMVNOs own spectrum.

Altice benefits from the extensive experience of its leadership in having launched and operated fixed and mobile broadband products globally prior to joining the Altice USA executive management team. In other global properties, Altice has more than 20 million mobile customers and has been offering prepaid and postpaid products for more than four years. In its international properties, Altice has entered the wireless market using 4G technology and will continue to manage its customer and wholesale relationships through the evolution from 4G to advanced 4G and ultimately to 5G. As Altice underwent these technology upgrades, those evolutions informed its spectrum strategy. As Altice is preparing to launch its mobile product in the United States, Altice has been able to leverage the learnings of its leadership teams through these technology changes to develop a mobile market entry strategy as well as its spectrum strategy for the domestic market.

The benefits to competition from the iMVNO model, as depicted in Exhibit 1, are on the cusp of realization, and iMVNOs will offer greater competitive benefits to consumers as they mature. However, those benefits depend on a competitive wholesale marketplace. Today, iMVNOs face a wholesale market with only two meaningful participants, Sprint and T-Mobile. If the merger proceeds, “New T-Mobile” will be the sole remaining wholesale player offering commercially reasonable rates. Given T-Mobile’s hostile comments towards MVNO agreements of any kind with cable operators, and its pointed lack of commitments to support the MVNO market, much less the iMVNO model, there is no reason to believe that the New T-Mobile will support wholesale arrangements for iMVNOs that pose a meaningful competitive threat. Furthermore, and despite T-Mobile’s statements to the contrary, an empiric analysis of the proposed merger makes clear that there will be fewer incentives for the remaining MNOs (AT&T, Verizon and the New T-Mobile) to enter into wholesale agreements post-merger.⁵ The New T-Mobile in particular, with its higher retail market share, will be less likely to offer competitive wholesale agreements to iMVNOs that will offer services that directly compete for its retail customers.⁶ Additionally, in a post-merger market, the remaining large MNOs, with significant retail share, can profitably engage a strategy of withholding output, or pricing it high, to restrain competition in order to maintain oligopolistic retail pricing and prevent competitive

⁴ Altice notes that the ability for customers to use both WiFi and cellular functions simultaneously depends on the capability of the end-user device, not whether the MVNO is an iMVNO.

⁵ See Exhibit 1 at 40-45.

⁶ See Exhibit 1 at 33-35, 42.

price threats from iMVNOs. If the merger proceeds as proposed, the combined entity will drive up wholesale prices in a manner that will diminish the iMVNO opportunity, and diminish retail competition in the wireless market.⁷

The best way the Commission can protect competition in the wholesale market is to deny the proposed merger because it will reduce the wholesale access market from two to one players, creating, in effect, a monopoly for the New T-Mobile. If the merger is to proceed, at a minimum, the Commission must address *some* of the harms of the transaction by requiring binding commitments from the New T-Mobile to provide durable, long-term, renewable, nationwide wholesale agreements on reasonable terms and a divestiture of spectrum and associated network assets to enable new wireless entry and competition.

c. the revenues, costs, and profitability of the Company’s wireless service;

Altice provides herein at Exhibit 3 a five-year business plan addressing projected revenues, costs and profitability of its wireless service.

d. any MVNO relationship the Company may have with a wireless company, including, but not limited to, the negotiations and financial terms of such MVNO contracts;

Altice herein supplements the materials provided to the Commission on November 13 and December 3, 2018 **{{BEGIN HCI** [REDACTED] **END HCI}}**

e. all plans to develop a facilities-based mobile wireless network or acquire spectrum or to use spectrum already acquired for mobile wireless service;

As noted above, the ability of an iMVNO to grow into a facilities-based wireless competitor, indeed the ability of an iMVNO to provide competitive wireless service, depends on a competitive wholesale marketplace. Without wholesale competition, the ability of iMVNOs to offer facilities-based competition with increased benefits for the wireless marketplace and consumers will be severely limited. Additionally, as the Commission is aware, a new facilities-based wireless network requires both coverage and capacity. The necessary “umbrella” of wireless coverage to maintain connectivity of mobile devices is provided by low-band, sub 1 GHz spectrum with more favorable propagation characteristics but less capacity. The MNOs largely control the low-band spectrum. Capacity on the network can be built out using smaller cells with higher frequency spectrum able to carry more data – Altice plans to build out its own small cells over time. Without both coverage and capacity, however, a mobile wireless network cannot be competitive. Thus, iMVNOs will continue to need reasonable, long-term wholesale agreements with MNOs for coverage, even as they build out their own facilities for capacity.

Altice provides herein at Exhibit 4 **{{BEGIN HCI** [REDACTED]

⁷ See Exhibit 1 at 40-45.

[REDACTED]

[REDACTED]

[REDACTED]

END HCI}}

As previously discussed, the iMVNO model will function as an on-ramp to greater facilities-based wireless competition over the long-term if properly enabled and supported – but the progress will be incremental.⁸ All iMVNOs will continue to rely on MNO partners for RAN for coverage. As standalone entities, Sprint and T-Mobile have strong incentives to provide wholesale RAN access to MVNOs.⁹ If the merger is approved, however, economic analysis

⁸ Traditional resale MVNOs cannot use an incremental approach to acquiring and deploying spectrum in service of their customers because the structure of traditional resale arrangements makes it impossible to integrate owned spectrum into consumer offerings. iMVNOs can “offload” traffic from the MNO network onto their own licensed wireless facilities as their networks mature. Resale MVNOs have to choose *either* the MNO network *or* their own network while iMVNOs can leverage *both* networks to provide wireless service.

⁹ See Exhibit 1 at 32-39.

suggest that those incentives will disappear.¹⁰ Moreover, AT&T and Verizon are not significant players in the wholesale market and do not have the incentive to serve iMVNOs in the wholesale market either pre- or post-merger. In order to maintain the pre-merger wholesale market, Altice sees no viable path other than denial of the proposed merger. However, if the merger is approved, Commission support for durable, reasonable, nationwide wholesale access, and the iMVNO model, is essential as a stepping-stone to the build out of future wireless networks and facilities that are necessary to ensure wireless facilities-based competition.¹¹

f. any actual or potential impacts of other cable wireless service on the Company's business generally.

{{BEGIN HCI

END HCI}}

2. Describe in detail how the Proposed Transaction could impact the Company's mobile wireless business.

Please see Altice's prior submissions in this proceeding, particularly Altice's Petition to Deny or Condition and Reply to Opposition.¹² Additionally, please see attached the Declaration of Michael Cragg and Eliana Garcés at Exhibit 1 that outlines the effects of the proposed merger on the retail market, wholesale market, and competition from iMVNOs.

3. Describe in detail how the Proposed Transaction could impact the Company's television and/or internet provision businesses.

Altice is aware of the claims made by the Applicants with regard to the speed, capacity, and price of 5G and its impact on in-home broadband.¹³ However, Altice also notes the mounting body of evidence that the Applicants' 5G claims are overstated and non-specific to the merger because each standalone company plans to deploy a 5G network.¹⁴

Altice believes that any impact from 5G is many years away. 5G operators have to deploy dense fiber networks with many small cells in order to offer services beginning to compare to Altice's wireline broadband offerings. This will take significant time and requires speculation regarding the state of the market, performance, and consumer uses and expectations. Altice has insight from 5G tests in Europe and believes that the performance claims made by the wireless operators today are at the outer limit of what may be possible based on the propagation

¹⁰ See Exhibit 1 at 33-35, 40-45.

¹¹ See Exhibit 1 at 49-51.

¹² See Reply of Altice USA, Inc., WT Docket No. 18-197 (filed Oct. 31, 2018); Petition to Condition or Deny of Altice USA, Inc., WT Docket No. 18-197 (filed Aug. 27, 2018).

¹³ See *Applications of T-Mobile US, Inc. and Sprint Corporation, Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, Public Interest Statement, 12-15 (filed June 18, 2018) ("Public Interest Statement").

¹⁴ See, e.g., Reply of DISH Network Corporation, WT Docket No. 18-197, 66-78 (filed Oct. 31, 2018); Petition to Deny of Free Press, WT Docket No. 18-197, 48-61 (filed Aug. 27, 2018).

characteristics of 5G. Ultimately, Altice does not see 5G as a suitable substitution of its fixed line products in the near future.

4. Provide all documents provided to any state or federal entity for purposes of reviewing the Proposed Transaction that relate to the items in Specifications 1(a)-(f).

Altice previously provided the Commission with documents responsive to this information request on October 17, November 13, and December 3, 2018.

EXHIBIT 1

Declaration of Michael Cragg and Eliana Garcés

Declaration of Michael Cragg and Eliana Garcés

January 25, 2019

TABLE OF CONTENTS

I. Qualifications4

II. Assignment4

III. Summary of opinions5

IV. Mobile wireless communications markets8

 A. Retail market 9

 1. Retail markets are differentiated..... 11

 2. MNOs and light MVNOs serve the retail market with differentiated offerings... 12

 3. Implications for market definition 15

 B. Wholesale markets 17

 1. MVNO control over the mobile service differs between light MVNO and iMVNO wholesale agreements..... 18

 2. iMVNO capabilities bring cost and quality control advantages that differ from light MVNOs and enable them to compete with MNOs 20

 3. Implications for market definition 23

V. The merger will result in a loss of competition and harm consumers at the retail level.....24

 A. The Applicants’ models predict an increase in prices, even with light MVNO competition..... 25

 1. Absent very large efficiencies, the merger produces significant harm..... 26

 2. The claimed efficiencies are insufficient to overcome consumer welfare harm .. 27

 B. Similar past mobile communication mergers have led to price increases..... 30

VI. The merger will result in a loss of competition and harm MVNO customers at the wholesale level.....31

 A. Sprint and T-Mobile currently have incentives to provide access to an iMVNO on fair terms 31

 1. Unlike AT&T and Verizon, Sprint and T-Mobile have incentives to provide commercially attractive iMVNO access 32

 2. The Sprint/Altice agreement reflects the favorable alignment of pre-merger incentives 37

 B. Post-merger competition to supply wholesale access to iMVNOs is harmed..... 40

 1. The merged entity will have lower incentives to grant RAN access to an iMVNO 40

 2. The merged entity will have the incentive and ability to degrade Sprint’s current deal with Altice 42

3.	The merger eliminates all competition to supply wholesale access to iMVNOs .	44
C.	The lack of competition for iMVNO access will produce higher consumer harm than currently foreseen due to the elimination of otherwise likely competitive entry.....	46
1.	<i>De Novo</i> entry of another MNO is unlikely and will not mitigate the harm from the merger	46
2.	Cable companies such as Altice are particularly well placed to become competitive as iMVNOs	49
3.	Absent the merger, Altice has viable plans to expand its wireless infrastructure, becoming comparable to an MNO over time	51
VII.	Structural models predict the consumer harm of the merger due to the harm to competition at both retail and wholesale iMVNO levels.....	53
A.	Cable operators seeking iMVNO access and their wireless consumers are harmed by the merger.....	54
B.	Merger-specific efficiencies are not sufficiently large to prevent consumer harm..	57
C.	Altice’s plans for disruptive entry in mobile wireless services suggest an even greater consumer harm	61
VIII.	If the merger proceeds, long-term nationwide wholesale access guarantees are needed to reduce at least some of the consumer harms	64
A.	Cable companies’ retail competition requires guarantees for iMVNO wholesale access.....	64
B.	Altice will not fully develop as a mobile wireless communication supplier if wholesale access to infrastructure is not guaranteed beyond five years	65
1.	Some post-merger conditions would be required for Altice to be able to fully develop as an iMVNO	65
2.	Altice needs contractual access for a period of up to 10 years.....	65
3.	Altice needs access to a nationwide network during its build up.....	66
4.	Altice would benefit from a divestiture of spectrum	67
	APPENDIX I: MERGER SIMULATION MODEL.....	69
A.	The baseline IKK model	69
B.	Extending the IKK model to include competition from cable operators	69
1.	Cable operator data inputs	70
2.	Calibration of the extended IKK model without wholesale iMVNO competition.....	72
3.	Simulation with an iMVNO hosted on T-Mobile as cable’s outside option	73
	APPENDIX II: CVS	76

I. QUALIFICATIONS

My name is Dr. Michael Cragg, and I am a Principal and Chairman of The Brattle Group, a global economic consulting firm headquartered in Boston, Massachusetts with additional offices in New York, San Francisco, Washington, D.C., Toronto, Brussels, London, Madrid, Sydney, and Rome. I am an expert in industrial organization and finance and recognized by Global Competition Review and Who's Who Legal as one of the world's top experts in antitrust. I have testified in a range of matters involving competition, market structure, and determining how market power and barriers to entry affect economic profits and the measurement of costs and revenues. I have a Ph.D. in economics from Stanford University and was an economics professor at Columbia University and University of California, Los Angeles, where I published broadly and taught courses in industrial organization, corporate finance, public sector economics, and microeconomics at both the undergraduate and graduate levels.

My name is Dr. Eliana Garcés, and I am a Principal with The Brattle Group. I am an expert in antitrust and regulatory matters and was a member of the cabinet of European Commission Vice President Joaquín Almunia, who was responsible for EU competition policy during 2010-2014. In that position I oversaw antitrust and merger investigations in financial services, information technology, telecommunications, and energy markets. I have served as a member of the European Commission Competition Chief Economist Team and was the Deputy Chief Economist in the European Commission's Directorate General for Internal Market and Industry. From 2016 to 2017, I was a Visiting Senior Fellow at George Mason University. I co-authored the widely-used textbook *Quantitative Methods in Antitrust and Competition Analysis* published by Princeton University Press. I hold a Ph.D. in Economics from the University of California, Los Angeles and a Licenciatura in Economics from Universidad Autónoma of Madrid, Spain.

Our CVs are provided in Appendix II.

II. ASSIGNMENT

We have been asked by counsel to Altice USA ("Altice") to assess the likely competitive effects of the proposed merger of Sprint Corporation ("Sprint") and T-Mobile US, Inc. ("T-Mobile") (together, the "Applicants"), including the impact on all types of mobile virtual network operators ("MVNOs") as well as what remedies would be required to mitigate some of the harms to competition in the wireless market should the merger proceed.

Wireless markets are supplied by three types of competitors: (1) mobile network operators (“MNOs”) that own the infrastructure and assets necessary to provide wireless service, in particular spectrum;¹ (2) light mobile virtual network operators (“light MVNOs”) that have no infrastructure of their own but that purchase and resell services from the MNOs; and (3) full infrastructure mobile virtual network operators (“iMVNOs”) that provide some of their own infrastructure, such as fixed network backhaul and Wi-Fi networks, and acquire the remaining components, notably radio access to spectrum, from MNOs. An iMVNO supplies all other aspects of the mobile offering, including the Subscriber Identity Module (“SIM”), roaming and network partners, data and Internet routing, voice messaging, rate charging, customer care, and billing, hereinafter referred to as “core control.” This model enables the iMVNO to provide facilities-based competition to the MNOs, including meaningful competition on price and product innovation for customers.

Because of its “core control” over most network components, an iMVNO is able to offer the full range of competition to the MNOs – from price, to quality, to the service offering itself. iMVNOs can innovate and provide new services without waiting or relying on the MNOs, leading to greater innovation at a faster pace. Ultimately, this innovation creates enhanced products, provides consumers with greater choice, and requires the MNOs to innovate themselves to keep up. iMVNOs are nascent competitors in the United States and typically involve cable companies because they already possess much of this infrastructure to serve their existing cable operations.

Altice is entering the mobile communications market as an iMVNO, and we have been asked to focus on the merger’s effects on the markets most relevant to Altice’s iMVNO business.

III. SUMMARY OF OPINIONS

The merger affects at least two product markets: (1) the retail market for mobile wireless telecommunications services for individuals (the “retail” market), and (2) the wholesale market for mobile wireless telecommunications network access for MVNOs (the “wholesale” market). Both the retail and wholesale markets may be subdivided further.

On the retail side, there are different submarkets for postpaid and prepaid plans, and plans are further differentiated based on the extent of data allowances and the level of service quality. Today,

¹ A wireless communications network essentially comprises two broad components: a wireless network, including the towers, radios, spectrum, and software platforms that control short distance connectivity and the interactions with the user devices; and a fixed communication network necessary to transport traffic over long distances, often referred to as “backhaul.”

the primary competitors in the market for high-quality (i.e., few data limitations and high service quality) postpaid plans are MNOs. iMVNOs are potential entrants into that market. In the market for lower-quality prepaid plans, light MVNOs now compete to some extent with MNOs (although many of the light MVNOs are controlled or wholly owned by one of the MNOs).

On the wholesale side, the market is composed of two distinct segments: (1) the supply of network access to light MVNOs (the “light MVNO wholesale market”) and (2) the supply of network access to iMVNOs (the “iMVNO wholesale market”). The customers, terms, and pricing are sufficiently different between these two segments that each should be considered its own distinct market for antitrust purposes. This is also illustrated by the differentiated behavior by MNO suppliers with respect to these two markets. {{BEGIN HCI

END HCI}}.²

There are currently four national U.S. MNOs. A merger between T-Mobile and Sprint, the third and fourth largest MNOs respectively, will decrease competition and result in higher prices at both the retail and wholesale levels. The light MVNO wholesale market is already highly concentrated and would become significantly more concentrated following the merger. The merger will *de facto* eliminate the iMVNO wholesale market altogether, as the merger will combine the two MNOs with the strongest incentives to provide this type of network access and greatly diminish the combined companies’ incentives to continue providing such access.

Pre-merger, Sprint has been willing to supply the iMVNO wholesale market. Sprint’s smaller position in the retail market relative to other MNOs increases the attractiveness of wholesale trade as a way to monetize its spectrum and amortize its capacity investment. The need for a wholesale stream of revenue is even more important for Sprint because it has been improving its infrastructure faster than it is able to improve its brand image and market share.

The Applicants rely entirely on network efficiencies to mitigate the anticompetitive effects of the merger. Their economists present models that require enormous efficiency gains for there to be any net increase in consumer welfare post-merger, and even then various groups would still be harmed as the average increase would rely on losses for some group being offset by gains to others.

² {{BEGIN HCI

END HCI}}.

Future competition from Altice and other iMVNOs will not be guaranteed by requiring that the merged entity honor existing commitments alone. Due to a change in the incentives of the new merged entity, ensuring that Altice is able to remain a source of long-term wireless competition will require the Commission to reject the merger.

IV. MOBILE WIRELESS COMMUNICATIONS MARKETS

Four national MNOs (Verizon, AT&T, T-Mobile, and Sprint)⁶ in the United States account for the vast majority of wireless service revenues, wireless subscribers, and available spectrum. The four national MNOs are active at both the retail and wholesale levels. At the retail level, they supply consumers with mobile telecommunications services. At the wholesale level, they provide mobile virtual network operators (“MVNOs”) with access to their networks that the MVNOs can then use to sell mobile services to consumers. **{{BEGIN HCI**

END HCI}} They do not control the management and quality of their retail services, instead relying on decisions made by the MNOs that supply them.⁷ There are several light MVNOs that purchase and resell mobile communications services from the four national MNOs, the largest being TracFone. Cable companies have also recently entered the mobile services market. **{{BEGIN HCI**

END HCI}}, bundling it with its fixed cable broadband offerings.⁸ Cable operator Altice, in contrast, is planning to launch in 2019 as an iMVNO, meaning it will rely on both its fixed infrastructure, including its

⁶ Some additional MNOs operate at a regional level and do not have national coverage. The largest one is U.S. Cellular, with all others being significantly smaller. *See Twentieth Report, In the Matter of Implantation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 17-69, FCC, September 27, 2017, ¶14, accessed November 29, 2018, https://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0927/FCC-17-126A1.pdf (“20th Mobile Wireless Competition Report”).

⁷ As will be further explained later, light MVNOs are MVNOs that do not control the SIM card on their customers’ devices. The SIM card is the heart of the handset which is directed by the MNO’s or iMVNO’s core control network infrastructure on how to interact with the other available infrastructure for the purposes of queueing, throttling, steering to cost effective backhaul, accessing traditional wireless RANs (RAN stands for “Radio Access Network,” which connect users’ devices through radio connections to other parts of a network) and seamless transitions to Wi-Fi connections. *See* Margaret Rouse, “radio access network (RAN),” TechTarget, October 2018, accessed January 2, 2019, <https://searchnetworking.techtarget.com/definition/radio-access-network-RAN>).

⁸ **{{BEGIN HCI**

HCI}}

END

own mobile core control network, and Sprint’s wireless infrastructure to maintain control over the service, allowing it to steer customers to the most efficient wireless networks.⁹ Altice will compete directly with high-end MNO products.

In the following sections, we describe in more detail the impact of the proposed merger on retail and wholesale mobile communications markets, explaining the differentiating factors among product offerings. We also derive implications for market definition in antitrust analysis.

A. RETAIL MARKET

The retail market consists of companies—primarily the big four MNOs—selling mobile service plans to customers. Today, the four national MNOs dominate retail service, directly supplying 86.6% of U.S. subscribers in 2017 and nearly all of the postpaid segment.¹⁰ The largest MVNO, on the other hand, serves only 6.5% of subscribers.¹¹

But even comparing the disparate market shares of the MNOs and the MVNOs currently active in the retail market overstates their actual level of competition with one another. That is because the retail market tends to be stratified between high-quality, generally postpaid plans and lower-quality, generally prepaid plans. These plans are not substitutes for one another from customers’ perspectives. They include different levels of service, different data download speeds, and a variety of usage limitations and thus attract different categories of customers. MNOs dominate the market for high-quality, postpaid plans even more thoroughly than they do the retail market generally. Most current MVNOs, on the other hand, focus their businesses on the lower-quality, restriction heavy, prepaid market. The different areas of focus for MNOs and existing MVNOs means that a 4-to-3 consolidation of the MNOs will have even bigger competitive impacts on the market than what would be predicted from just looking at raw market shares. Because the Federal Communications Commission (“FCC” or “Commission”) has considered a broad product market in previous merger reviews, which includes both postpaid and prepaid wireless products, we present data on a combined market.

⁹ {{BEGIN HCI
END HCI}}

¹⁰ Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas, Exhibit B to Petition to Deny of DISH Network Corporation, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, August 27, 2018 (henceforth “HBVZ Initial Declaration” or “*HBVZ I*”). *See* Table 1.

¹¹ *See* Table 1.

Table 1: Total Connections and Market Shares, 2014-2017

	2014	2015	2016	2017
Total Connections (millions)				
AT&T	86.8	88.7	91.3	93.2
Verizon	108.2	112.1	114.2	116.3
Sprint	45.4	45.6	43.5	40.9
T-Mobile	42.2	47.0	51.1	54.8
U.S. Cellular	4.6	4.8	5.0	5.0
TracFone	26.0	25.7	26.1	23.1
Other MVNO	13.0	17.8	19.5	19.4
Total	326.3	341.6	350.7	352.8
Market Share (%)				
AT&T	26.6%	26.0%	26.0%	26.4%
Verizon	33.2%	32.8%	32.6%	33.0%
Sprint	13.9%	13.3%	12.4%	11.6%
T-Mobile	12.9%	13.8%	14.6%	15.5%
U.S. Cellular	1.4%	1.4%	1.4%	1.4%
TracFone	8.0%	7.5%	7.4%	6.5%
Other MVNO	4.0%	5.2%	5.6%	5.5%
Total	100.0%	100.0%	100.0%	100.0%
HHI	2,250	2,204	2,193	2,236

Source: *HBVZ I*, pp. 28, 35.

Notes: Connection counts are end of year December 31, as determined from 2014-2017 Company Annual Reports.

Market shares do not capture the fact that competition for retail mobile services is defined by the supply of an array of differentiated products. Within this array, traditional light MVNOs do not operate in the same consumer segments as MNOs and, as a result, these MVNOs put limited competitive pressure on MNOs. This segmentation originates at the wholesale level, because the types of wholesale contracts granted by MNOs largely determine the retail services that MVNOs can supply.

This market is considered “moderately concentrated” with a Herfindahl-Hirschman Index (“HHI”)—a measure of market concentration—of 2,236.¹²

¹² See U.S. Department of Justice & Federal Trade Commission, *Horizontal Merger Guidelines*, (2010).

1. Retail markets are differentiated

Mobile service plans come in many different varieties. The largest distinction is between prepaid plans and postpaid plans. Prepaid plans are plans for which customers pay upfront for a specific amount of data, voice, and SMS services. Once they have used their allotment, prepaid customers are cut off from the network until they “recharge” their account.¹³ For postpaid plans, on the other hand, customers receive a bill at the end of the month based on their usage. Today, more than 20% of mobile wireless plans in the United States are prepaid.¹⁴ Prepaid plans tend to be more attractive options for lower-income customers, as they tend to be cheaper and do not require a credit check.¹⁵ They are also more attractive to less-intensive data users (*e.g.*, users who do not stream videos frequently).¹⁶

More relevant to our discussion, mobile service plans vary significantly in terms of usage restrictions and access to services. Some plans limit their customers’ voice, text, or data usage, while other, more expensive plans offer unlimited access. Plans also differ in terms of what happens when customers reach their usage limit. For some lower-end plans, carriers will slow customers’ data speeds when they reach their usage limit. For others, carriers will just de-prioritize customers’ data connections so that they will only experience slower speeds when there is high congestion on the network. Some carriers also offer cheaper plans that come with limited levels of customer support and retail outlets or with restrictions on which devices their customers can use. Some of the cheaper plans do not allow tethering, international roaming, voice-over-IP, or group and family plans. Wireless services plans are markedly different and subscribers chose among them based on their usage preferences and budget.

Access and quality of video streaming is another differentiating factor. The term over the top content (“OTT”) refers to content distributed directly to viewers over the Internet, bypassing traditional cable and broadcast television platforms that control and distribute content. The advent of OTT services provides opportunities for wireless carriers to focus on access to media content as

¹³ See *HBVZ 1*, p. 27.

¹⁴ See *HBVZ 1*, p. 40 at Table 17.

¹⁵ See Ethan Popowitz, “Prepaid vs Postpaid – Which is Better?” MoneySavingPro, November 2, 2018, accessed January 2, 2018, <https://www.moneysavingpro.com/cell-phone-plans/prepaid-vs-postpaid/>.

¹⁶ See Sascha Segan, “The Best Cheap Cell Phone Plans You’ve Never Heard Of,” *PCMag*, October 16, 2018, accessed December 12, 2018, <https://www.pcmag.com/article2/0,2817,2375644,00.asp>.

a differentiating factor.¹⁷ MNOs are currently developing strategies to bundle content and high quality connectivity to attract subscribers and increase revenues. MNOs with fixed communication business units can also leverage their fixed line business and offer a multiple-play bundles of mobile communication services with fixed broadband or TV. AT&T currently offers such bundles within its fixed broadband footprint and others, in particular cable companies, are expected to follow its lead.¹⁸

2. MNOs and light MVNOs serve the retail market with differentiated offerings

Since their retail plans differ in terms of quality and targeted users, MNOs and MVNOs differ markedly in the segments they focus on. MNOs serve predominantly high-quality postpaid plans and most light MVNOs serve lower-quality and generally prepaid plans. An exception are the cable companies' light MVNOs that provide higher quality postpaid products to their fixed line customers.¹⁹ iMVNOs have not entered the market yet, but as we will explain below, they will be able to compete with MNOs in the market for high-quality postpaid plans when they do.

Light MVNOs depend on MNOs for the delivery of their service and as a result are constrained to offer plans that cannot rival those of MNOs. Without their own infrastructure or SIM card control, light MVNOs must delegate all network traffic management decisions to the MNO which then determines the quality of the service. By controlling the SIM cards, the host MNO also controls device updates and specific features supported by the device. For instance, light MVNOs are often

¹⁷ {{BEGIN HCI

END HCI}}.

¹⁸ AT&T offers AT&T wireless bundled with DirectTV and AT&T internet. *See* "DirectTV," AT&T, accessed January 2, 2019, <https://www.att.com/directv/>. Verizon does not currently bundle its mobile wireless service with its fixed broadband plans. *See also* "U.S. Cable Companies' Wireless Entry Paves Way for 'Quad' Play," Reuters, June 30 2017, accessed January 2, 2019, <https://www.reuters.com/article/us-sprint-m-a-quadplay-analysis-idUSKBN19L2HW>.

¹⁹ Cable companies typically have light MVNO contracts that allow them to offer higher quality services but limit their expansion. *See* {{BEGIN HCI

END HCI}} *See also* "the Verizon MVNO limits Comcast to its existing footprint," Elise Reuter, "Why are cable companies calling on wireless?" Kansas City Business Journal, June 28, 2017, accessed January 10, 2019, <https://www.bizjournals.com/kansascity/news/2017/06/28/cable-wireless-business-combinations.html>.

limited in their ability to provide Wi-Fi calling or tethering.²⁰ Light MVNOs also cannot switch MNO partners without swapping out customers' handsets and SIM cards.

MNOs often deliver sub-par quality service to MVNOs' customers. One study found that in United States, light MVNOs often underperformed their host carriers in speed and quality of web access, video streaming, and voice calls.²¹ The largest discrepancies were in data performance, with some MVNOs having page load times up to six times worse than base carriers. Another report, by network testing firm Tutela, examined a selection of MVNOs on each of the four major U.S. carriers and found that average download speeds were 23% worse for MVNOs than for their host operators.²² Host providers' throttling²³ and de-prioritization²⁴ also leads to the degraded service of light MVNOs.²⁵

Light MVNOs fully depend on MNOs for their product's quality and services, and cannot independently choose how to position their offers. Therefore, MNOs can ensure that independent light MVNOs do not cannibalize their core business and can confine them to less profitable niches. The mobile wireless services offered by light MVNOs tend to target low budget, price-sensitive (i.e. quality insensitive) segments not served by MNOs. MNOs benefit from such positioning as light MVNOs allow them to price discriminate without degrading their brand or reducing sales of their mainstream offers.

²⁰ See, e.g., Kevin Mercadante, "The Best MVNO Plans for Your Money," DoughRoller, March 28, 2018, accessed December 10, 2018, <https://www.doughroller.net/reviews/the-best-mvno-plans-for-your-money/>.

²¹ Fatima Zarinni, Ayon Chakraborty, Vyas Sekar, Samir R. Das, and Phillipa Gill, "A First Look at Performance in Mobile Virtual Network Operators," in *Proceedings of the 2014 Conference on Internet Measurement Conference*, ACM, 2014, p. 2, accessed December 5, 2018, <https://people.cs.umass.edu/~phillipa/papers/mvno.pdf>.

²² Tutela, "US Mobile LTE Network Quality 2018," p. 2, accessed December 5, 2018, <http://assets.fiercemarkets.net/public/007-Telecom/tutela1.pdf>.

²³ Throttling is the practice of reducing data speeds, for example when a customer has reached a certain data threshold for a billing period.

²⁴ De-prioritization provides slower data speeds during times of congestion. See "Throttling vs. Data Deprioritization," Wirefly, accessed December 5, 2018, <https://www.wirefly.com/guides/throttling-vs-data-deprioritization>.

²⁵ See Tina Chang, "What is an MVNO", WhistleOut, accessed January 4, 2019, <https://www.whistleout.com/CellPhones/Guides/What-is-a-MVNO>.

Evidence shows that users of light MVNOs and regional carriers tend to have a **{{BEGIN HCI
END HCI}}**.²⁶

A survey carried out by Altice among its Optimum and Suddenlink subscribers with mobile services found that **{{BEGIN HCI**

END HCI}}.²⁷ Data presented by the Applicants' experts also show that customers of regional carriers and light MVNOs together represent **{{BEGIN HCI
END HCI}}** of light mobile data users but less than **{{BEGIN HCI
END HCI}}** of heavy data users.²⁸

Light MVNO offerings tend to be less expensive overall,²⁹ but the cheap plans generally offer lower levels of data usage at a higher price per gigabyte. They also impose more service restrictions,³⁰ so MNOs' brands become more attractive than light MVNOs' as usage or ability to spend increases. Although light MVNO brands offer a lower total price for unlimited plans,³¹ they must impose important limitations that degrade the quality of the service. Common restrictions found in MVNO service plans, but not found in most entry-level unlimited plans for MNO brands, include sub-LTE data speed caps, lack of mobile hotspot or roaming capabilities, a more limited selection of phones

²⁶ Economic Analysis of the Proposed T-Mobile/Sprint Merger by John Asker, Timothy F. Bresnahan, and Kostis Hatzitsaskos, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, November 6, 2018, pp. 30-31 at Exhibits 8 and 9 (henceforth "ABH Report").

²⁷ **{{BEGIN HCI**

END HCI}}.

²⁸ ABH Report, p. 33 at Exhibit 11.

²⁹ SpeedTalk has \$5/month plans and several other MVNOs offer \$10/month plans with limited usage allowances. See Sascha Segan, "The Best Cheap Cell Phone Plans You've Never Heard Of," *PCMag*, October 16, 2018, accessed December 12, 2018, <https://www.pcmag.com/article2/0,2817,2375644,00.asp>.

³⁰ This is generally highlighted in the specialized press. See, e.g. "What Is an MVNO Cell Phone Carrier?" *Lifewire* December 3, 2018, accessed January 2, 2019, <https://www.lifewire.com/what-is-an-mvno-cell-phone-carrier-578673>

³¹ Basic single line unlimited data plans for the Big 4 carriers fall between \$60 and \$75. Examples of unlimited data MVNO plan prices include a \$40 plan with TextNow, a \$42 and \$47 plan from US Mobile, a \$45 plan from Xfinity Mobile, and \$55 plans from Page Plus and StraightTalk. See "Best Unlimited Data Cell Phone Plans," Wirefly, accessed December 27, 2018, <https://www.wirefly.com/guides/best-unlimited-data-plans>; See also "Service Plans," Straight Talk, accessed December 19, 2018, <https://www.straighttalk.com/wps/portal/home/shop/serviceplans>; See also "The \$55," pageplus, accessed December 28, 2018, <https://www.pagepluscellular.com/plans/the-55/>.

available to purchase, and overall slower speeds than their host MNOs.³² Many of these limitations result directly from the fact that the host MNO retains control over network access for the MVNO's subscribers through core control, as discussed above.

3. Implications for market definition

The relevant product market in antitrust “is composed of products that have reasonable interchangeability for the purposes for which they are produced— price, use and qualities considered.”³³ Product markets are defined with regard to demand substitution, which focuses on buyers' views of which products are acceptable substitutes or alternatives.³⁴ An antitrust product market consists of all goods or services that buyers view as close substitutes. Substitution is manifested by the diversion of sales in response to relative price changes. That is, if the price of one product goes up, and in response consumers switch to buying a different product to such an extent that the price increase becomes unprofitable, those two products may be in the same product market. Conversely if following a price increase, consumers do not switch to different products, then these other products may not be in the product market for purposes of assessing a merger's effect on competition.³⁵

³² See Tina Chang, “What is an MVNO”, WhistleOut, accessed January 4, 2019, <https://www.whistleout.com/CellPhones/Guides/What-is-a-MVNO>; See also “Best Unlimited Data Cell Phone Plans,” Wirefly, accessed December 27, 2018, <https://www.wirefly.com/guides/best-unlimited-data-plans>; See also Tutela, “US Mobile LTE Network Quality 2018,” p. 2, accessed December 5, 2018, <http://assets.fiercemarkets.net/public/007-Telecom/tutela1.pdf>; See also Sean Riley, “What is TextNow, and is it Worth It?” tom's guide, August 14, 2018, accessed December 27, 2018, <https://www.tomsguide.com/us/textnow-faq.review-4582.html>; See also “Service Plans,” Straight Talk, accessed December 19, 2018, <https://www.straighttalk.com/wps/portal/home/shop/serviceplans>; See also “Terms and Conditions,” Straight Talk, accessed December 27, 2018, <https://www.straighttalk.com/wps/portal/home/h/legal/terms-and-conditions>; See also Sean Riley, “What is Xfinity Mobile, and is it Worth It?” tom's guide, December 19, 2018, accessed December 27, 2018, <https://www.tomsguide.com/us/xfinity-mobile-faq.news-25223.html>; See also “The \$55,” pageplus, accessed December 28, 2018, <https://www.pagepluscellular.com/plans/the-55/>.

³³ *United States v. E. I. du Pont de Nemours & Co. (Cellophane)*, 351 U.S. 377, 404 (1956); see also *United States of America v. Microsoft Corporation*, 253 F.3d at 51–52 (“Because the ability of consumers to turn to other suppliers restrains a firm from raising prices above the competitive level,’ the relevant market must include all products ‘reasonably interchangeable by consumers for the same purposes.’” (quoting *Rothery Storage & Van Co. v. Atlas Van Lines, Inc.*, 792 F.2d 210, 218 (D.C. Cir. 1986) and *United States v. E. I. du Pont de Nemours & Co. (Cellophane)*, 351 U.S. at 395)).

³⁴ Jonathan B. Baker, “Market Definition: An Analytical Overview,” *Antitrust L.J.* 74 (2007): 132.

³⁵ “Markets,” Federal Trade Commission, accessed December 18, 2018, <https://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws/mergers/markets>.

The positioning of the products offered by light MVNOs indicate they are not close substitutes for most products of MNOs. This is illustrated by the limited switching between them despite the environment of frequent price offers that characterizes the sector. Diversion ratios indicate that

{{BEGIN HCI

END HCI}}.³⁸

Further evidence of segmentation is the fact that the four premium MNO brands react to each other’s commercial offers, but largely ignore the lower prices or discounts provided by light MVNOs. For example, in its most recent annual assessment of the state of competition in the mobile wireless communications market, the FCC detailed how Sprint, Verizon, and AT&T responded to the introduction by T-Mobile of an unlimited data plan in August 2016 and how they matched zero rating offers that same year.³⁹ The report also describes one MNO’s targeted campaign to poach customers of other premium brands.⁴⁰ In contrast, the FCC assessment of competition does not document any competitive response by the four premium brands to offers of more attractive commercial conditions or service innovations by light MVNOs—despite the low posted prices they often advertise.⁴¹ The FCC had already previously noted in 2010 that “because

³⁶ Harris Mobile Insights Survey January – April 2018. *See* IKK Backup Materials.

³⁷ Harris Mobile Insights Survey January – April 2018. *See* IKK Declaration, p. 131 at Table 28. *See also* Reply Declaration of Joseph Harrington, Coleman Bazelon, Jeremy Verlinda, and William Zarakas, Exhibit B to Petition to Deny of DISH Network Corporation, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, October 31, 2018, Backup Materials, (henceforth “HBVZ Reply Declaration” or “HBVZ 2”).

³⁸ In some instances, the MVNOs are owned and controlled directly by an MNO. Services affiliated with an MNO parent tend to provide better quality, i.e., less service restrictions or higher usage for the price.

³⁹ 20th Mobile Wireless Competition Report, ¶¶ 51-52.

⁴⁰ 20th Mobile Wireless Competition Report, ¶ 51 at footnote 166.

⁴¹ As it relates to the treatment of MNVOs, “...the Commission generally has excluded Mobile Virtual Network Operators (‘MNVOs’) [Sic] and resellers when computing initial concentration measures, though it does take into account the role of such providers to the extent necessary in evaluation of likely competitive effects, and we take the same approach here.” Staff Analysis and Findings, *In the Matter of Applications of*

MVNOs purchase their mobile wireless services in wholesale contracts from facilities-based providers, the ability of MVNOs to compete against their host facilities-based provider is limited.”⁴² The FCC was referring to the full dependence of light MVNOs on their host MNOs.

Abstracting from the exact contours of the antitrust product market, our analysis focuses on how MNO and different MVNO brands are positioned to compete against each other within the broad competitive landscape. Fully understanding this impact requires turning to the source of the differences in retail market positioning, which is the nature of the wholesale contracts granted to MVNOs.

B. WHOLESALE MARKETS

Mobile wireless wholesale markets consist of MNOs selling network access and other services to MVNOs so that those MVNOs can then offer mobile services to customers in the retail market. All four national MNOs provide some level of wholesale supply to MVNOs. At least 58 independently owned MVNO brands are currently active in the U.S.⁴³ All of these are light MVNOs. These MVNOs account for roughly 42.5 million connections.⁴⁴ The largest of these MVNOs is TracFone, which accounts for approximately 23 million connections—more than half of all MVNO connections.⁴⁵

Like the retail market, the wholesale market can be further subdivided into two smaller markets: (1) the wholesale market for mobile network access sold to light MVNOs (“light MVNO wholesale market”) and (2) the wholesale market for mobile network access sold to iMVNOs (“iMVNO wholesale market”). The distinction between the two lies in the degree of control granted to the MVNO over the services they can provide. To date, a **[[BEGIN HCI**

END HCI}}

AT&T Inc. and Deutsche Telekom AG for Consent to Assign or Transfer Control of Licenses and Authorizations, WT Docket No. 11-65, FCC, November 29, 2011, (henceforth “FCC Staff Report”).

⁴² Fourteenth Report, *In the Matter of Implantation of Section 6002(B) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 17-69, FCC, May 20, 2010, ¶32, accessed January 2, 2019, <https://www.fcc.gov/reports-research/reports/commercial-mobile-radio-services-competition-reports/mobile-wireless>.

⁴³ This number excludes those owned and operated by one of the four national network operators. *See HBVZ I*, p. 38 at Table 36.

⁴⁴ *See* Table 1, summing TracFone and Other MVNOs.

⁴⁵ *See* Table 1.

T-Mobile and Sprint are the top two players in the light MVNO wholesale market—together they account for more than 60% of light MVNO wholesale connections (i.e., 26.6 million of the estimated 42.5 million connections).⁴⁶

{{BEGIN HCI END HCI}} in the third quarter of 2019. The iMVNO wholesale market is thus a new market, and we will show later that Sprint and T-Mobile are the only likely providers.

1. MVNO control over the mobile service differs between light MVNO and iMVNO wholesale agreements

There are several “ingredients” needed to provide an offer of mobile wireless services to customers at the retail level. These ingredients include:

- Access to a radio access network (“RAN”);⁴⁷
- SIM cards;
- Roaming and network partners;
- Data and internet access;
- Voice and messaging services;
- Rating and charging;⁴⁸ and
- Customer care and billing services.

The RAN allows the wireless signal to connect to the core network, and the SIM card on the device enables control of traffic routing and traffic management. The SIM card also authorizes service to the device. The core network controls and manages traffic, including roaming, through the SIM card.

As illustrated in Figure 1 below, light MVNOs acquire the vast majority of these ingredients from MNOs through the light MVNO wholesale market (the “white label” MVNOs in the diagram are MVNOs that are either controlled entirely or operated by the MNOs and simply rebrand the

⁴⁶ *HBVZ I*, p. 38 at Table 16.

⁴⁷ Herein, RAN refers to the spectrum, the base stations, and direct backhaul from base stations where an iMVNO, such as Altice, receives its customers’ traffic.

⁴⁸ Rating is the ability to see customer usage in real time and charging is the ability to charge based on that usage.

MNOs’ wireless services). Certain capabilities, such as voice-over-LTE, can differ between light MVNOs.⁴⁹ But light MVNOs never possess a fundamental capability—control over the SIM card—which grants control of traffic routing, traffic management, and the services available on the device. SIM card control is necessary to use multiple RAN providers and introduce software innovations and new services. Most importantly, SIM card and core control are necessary to switch users between MNOs without swapping out users’ handsets or SIM cards.

Figure 1: MVNO Type Distinctions

	Radio Sites	Access (e-)SIMs	Roaming	Data Internet...	Voice Messages	Rating Charging	MVNO CRM	MVNO Billing
White Label		Access Control	Roaming Partners & Networks	Data Services	VoLTE/ VoWiFi SMS	Online Rating Charging	Customer Portal CRM	Customer Billing
Light MVNOs		Access Control	Roaming Partners & Networks	Data Services	VoLTE/ VoWiFi SMS	Online Rating Charging	Customer Portal CRM	End Customer Billing
		Access Control	Roaming Partners & Networks	Data Services	VoLTE/ VoWiFi SMS	Online Rating Charging	Customer Portal CRM	End Customer Billing
Full MVNO		Access Control	Roaming Partners & Networks	Data Services	VoLTE/ VoWiFi SMS	Online Rating Charging	Customer Portal CRM	End Customer Billing

Legend:			
	Multiple Partners	MNO Managed	MVNO Managed

Source: Letter from Jennifer Richter, Counsel for Altice, to Marlene H. Dortch, Secretary, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, September 20, 2018.

iMVNOs control the SIM cards on their users’ device and have full control of the services provided and the management of the traffic. They only acquire RAN access from MNO wholesalers. They then combine this RAN access with their own core network, including the SIM, routers, and switches to provide their service. iMVNO contracts with MNOs are thus essentially just roaming agreements for access to an MNO’s RAN that allow an iMVNO to achieve the best balance of service and pricing by switching users from one network to another.

⁴⁹ These differences are identified by comparing the two rows depicting light MVNO in Figure 1. In the lower of these rows, control over voice, messaging (SMS) and rating/charging is granted to the light MVNO.

MNOs' supply relationships with light MVNOs thus differ from their supply relationships with iMVNOs in terms of the level of services the MNOs allow. They also differ in terms of their ability to optimize network usage. Because light MVNOs surrender control over their customers' SIM cards to their MNO partners, light MVNOs are fully dependent on their host MNO for the customer's traffic management. Although light MVNOs may be able to choose their host MNO at the start, once their service is launched they lose the ability to leverage different MNOs' offers and become fully dependent on the host. For example, in the case of the light MVNO TracFone, which has arrangements with multiple MNOs for its brands, customers must choose their device depending on which MNO will host them and the customers' device becomes exclusively controlled by the chosen MNO.⁵⁰

An MVNO operator with its own network infrastructure is a candidate for an iMVNO wholesale contract that would enable it to provide services on par with the MNOs' own offerings. But without an agreement that grants traffic management and SIM card control, it will be forced to operate as a light MVNO. **{{BEGIN HCI**

END HCI}}.⁵¹ **{{BEGIN**

HCI

END HCI}}.⁵²

2. iMVNO capabilities bring cost and quality control advantages that differ from light MVNOs and enable them to compete with MNOs

The distinction between light MVNOs and iMVNOs is critical because of their differential retail impact and ability to compete with the MNOs. As discussed in the previous section on retail competition, light MVNOs' retail offerings do not put significant competitive pressure on MNOs. iMVNOs, however, are different. By taking full control of their traffic and service management, they have the ability to compete for the same customers that MNOs typically target at the retail

⁵⁰ Dennis Bournique, "How to Tell Which Network (AT&T, T-Mobile, Sprint or Verizon) a TracFone, NET10 or Straight Talk Phone Uses," Prepaid Phone News, October 31, 2014, accessed December 19, 2018, <https://www.prepaidphonenews.com/2011/12/how-to-get-tracfone-net10-or-straight.html>.

⁵¹ **{{BEGIN HCI**

END HCI}}

⁵² **{{BEGIN HCI**

END HCI}}

level. iMVNOs’ control over the user experience can guarantee both network quality and product offerings which can compete head-to-head with those being offered by the MNOs.

Besides replicating their service offers, iMVNOs can compete with MNOs on costs. First, the iMVNO’s core control allows it to control the routing of all data traffic, text messaging, and calls, thereby controlling costs, such as backhaul, in a way that light MVNOs cannot. The iMVNO can dynamically steer users to a host MNO, its own Wi-Fi, or its own licensed spectrum network. An iMVNO can also negotiate access agreements with multiple MNOs which can provide alternative options for routing its traffic, potentially at a lower cost for consumers.⁵³

Second, an iMVNO can utilize network infrastructure that it either owns or has access to. Cable providers’ Wi-Fi hotspot connections are one such example. Altice has thousands of Wi-Fi access points deployed throughout homes, businesses, and certain outdoor areas that it can use as an alternative to Sprint’s cellular network, lowering its wholesale costs and thereby creating greater retail competition with AT&T and Verizon.⁵⁴

An iMVNO also has the incentive to improve mobile service coverage and capacity within its footprint. This includes investment in both traditional macro-cell towers and small cells. Small cells are small radio devices that can be deployed using existing infrastructure, including poles and cable wires (i.e., “strands”), for minimal cost.⁵⁵ “Airstand” devices are such an example of a new cost-effective infrastructure that involve the deployment of small cell networks.⁵⁶ Unlike traditional macro cell towers, there is no need to obtain additional permitting which expedites deployment:⁵⁷ cable personnel attach small cell devices to existing neighborhood cable wires and

⁵³ The ability of iMVNOs to negotiate such deals will also likely be driven by the size of its customer base and resulting traffic usage, since a larger MVNO will be more likely to negotiate more favorable discounts in exchange for a larger volume of traffic.

⁵⁴ The potential for cable companies to offload large amounts of traffic from cellular networks to Wi-Fi connections is highlighted by economist Michelle Connolly in a recent working paper that was sponsored by T-Mobile. *See* Connolly 2018, p. 19.

⁵⁵ The small cells Altice deployed in its arrangement with Sprint belong to and are operated by Sprint, using Sprint’s licensed 2.5 GHz spectrum. Altice could deploy units for its own use in a similar manner, possibly operating using CBRS spectrum, which the FCC is in progress of finalizing.

⁵⁶ **{{BEGIN HCI**

END HCI}}

⁵⁷ In an earnings call, Sprint’s CFO Tarek Robbiati explained that Altice’s “aerial cable provides power in the backhaul that was very important for us... It doesn’t involve permitting. So there is a time-to-market element

other facilities that Altice already owns and manages. The deployment of small cells on Altice’s backhaul is the principal means through which Sprint obtains network densification in its relationship with Altice.⁵⁸

The combination of options described above enables iMVNOs to operate an efficient and competitive mobile wireless service and more rapidly realize economies of scale by aggregating customers and their usage. Prior to the entry of iMVNOs, such economies of scale have generally been limited to the MNOs.⁵⁹

Thanks to these characteristics, iMVNOs can compete for customers interested in “unlimited data” plans, which are the MNOs’ main retail product with **{{BEGIN HCI**

END HCI}}.⁶⁰ Since average data usage per device is projected to rise substantially over the next several years, the ability of iMVNOs to offer competitive unlimited plans will remain important over time.⁶¹

Finally, iMVNOs are also uniquely situated to compete with some MNOs’ bundled offerings. Since iMVNOs are typically cable companies, they are well placed to offer attractive content bundles and can also competitively offer “quadruple-play” bundles (i.e., broadband Internet access, cable television, telephone, wireless service) that rival the “quad” bundle currently offered by AT&T.⁶²

that is really valuable to us.” See Colin Gibbs, “Sprint: Altice deal lets us cut through red tape of small-cell deployments,” *FierceWireless*, December 7, 2017, accessed December 5, 2018, <https://www.fiercewireless.com/wireless/sprint-altice-deal-enables-us-to-cut-through-red-tape-small-cell-deployments>.

⁵⁸ Under their agreement, **{{BEGIN HCI**

END HCI}}.

⁵⁹ Light MVNO agreements, however, can benefit from volume-based pricing discounts, which can be beneficial.

⁶⁰ **{{BEGIN HCI**

END HCI}}.

⁶¹ Ericsson projects that monthly mobile data traffic per smartphone in North America will increase from 7.2 gigabytes at the end of 2017 to 49 gigabytes by the end of 2023. See “Ericsson Mobility Report,” Ericsson, June 2018, p. 14, accessed December 11, 2018, <https://www.ericsson.com/assets/local/mobility-report/documents/2018/ericsson-mobility-report-june-2018.pdf>.

⁶² Nicole McCoy, “Xfinity Mobile’s Surprising Impact on the Cable Industry,” *Market Strategies*, May 4, 2018, accessed December 12, 2018, <https://www.marketstrategies.com/blog/2018/05/xfinity-mobiles-surprising-impact-on-the-cable-industry/>.

3. Implications for market definition

The differences between the light MVNO wholesale market and the iMVNO wholesale market suggest that regulators should view the markets separately when evaluating the competitive effects of the proposed merger.

Given the nascence of the iMVNO wholesale market (Altice is the first iMVNO customer in the market) it is not possible to conduct an empirical analysis of differences between it and the light MVNO market, such as the Federal Trade Commission (“FTC”) and Department of Justice (“DOJ”) Horizontal Merger Guidelines’ SSNIP test.⁶³ But a qualitative analysis points to the fact that, from an MVNO customer’s perspective, light MVNO supply agreements are not substitutes for iMVNO supply agreements. MNOs do not provide the same level of traffic and service control to MVNO customers in the two markets. Moreover, the inherent dependence on host MNOs in light MVNO agreements precludes the opportunities for network usage optimization that iMVNO contracts can provide. These differentiating factors have an important impact on the MVNO’s retail positioning downstream and their ability to become meaningful mobile service providers on par with MNOs.

The difference between light MVNOs and iMVNOs is highlighted by the fact that the FCC granted numbering resources to Altice for its iMVNO mobile wireless service. The FCC noted that the Altice iMVNO arrangement with Sprint coupled with its mobile network infrastructure “distinguishes its method of providing service, including its needs for direct access to numbers, from that of a traditional MVNO reseller.”⁶⁴ Altice will use its own numbers to “manage its mobile network, switch and route wireless calls, and compete effectively in the market to a degree not possible for a resale MVNO.”⁶⁵

The light MVNO wholesale market and the iMVNO wholesale market are also considered separate from the MNOs’ perspective, as evidenced by their different levels of willingness to serve the two markets. Their differentiated behavior is driven by the different competitive impact that light MVNOs and iMVNOs will have at the retail level.

⁶³ See U.S. Department of Justice & Federal Trade Commission, *Horizontal Merger Guidelines*, (2010), §4.1 for a discussion of the Small but Significant and Non-transitory Increase in Price (“SSNIP”) test.

⁶⁴ Order, *In the Matter of Numbering Policies for Modern Communications Number Resource Optimization*, WC Docket No. 13-97, December 21, 2018, ¶9.

⁶⁵ *Id.*, ¶¶10-11.

Nor do cable operators view light and iMVNO wholesale agreements as substitutes. The acceptance of a light MVNO agreement is rather a manifestation of what is commonly called “the cellophane fallacy.”⁶⁶ This fallacy illustrates the risk of wrongly including a product in a market when prices in the market of interest are already high relative to costs and customers start using as substitutes products that have very different, and normally less suitable, characteristics. **{{BEGIN HCI**

END HCI}}.

In sum, commercial realities suggest that there is a wholesale market for iMVNO access to MNO networks and a separate market for light MVNO access to MNO networks. When analyzing the competitive effects of the proposed merger, regulators should thus consider its effects on each of these markets independently.

V. THE MERGER WILL RESULT IN A LOSS OF COMPETITION AND HARM CONSUMERS AT THE RETAIL LEVEL

According to the antitrust agencies’ own horizontal merger guidelines, the merger is presumptively anticompetitive because it will move the retail market from a pre-merger HHI of 2,236 to a post-merger HHI of 2,596.⁶⁷ That increase of 361 points⁶⁸ would transition the market from “moderately concentrated” to “highly concentrated,” as defined by the merger guidelines. The Applicants try to rebut the presumptively anticompetitive effects of the merger by pointing to studies from their economists that claim that sufficient efficiencies will be generated to compensate for the consumer harm produced by the reduced competition.

⁶⁶ A light MVNO relationship does not allow cable companies to launch an iMVNO capable of competing with MNOs at retail. In viewing those light MVNO contracts as substitutes for iMVNO contracts, regulators would fall prey to the “the cellophane fallacy” phenomenon. This “fallacy” was first identified in a monopolization case in the early 1950s where consumers had switched away from cellophane paper towards inferior alternatives due to its high prices. *See* Gene C. Schaerr, “The Cellophane Fallacy and the Justice Department’s Guidelines for Horizontal Mergers,” *The Yale Law Journal* 94(3) (1985): 670-693. The fallacy illustrates the risk of wrongly including a product in a market when prices in the market of interest are so high that customers use products that are not in the same market as substitutes.

⁶⁷ *See* Table 2.

⁶⁸ Calculation difference due to rounding.

assume that service providers can be grouped into “nests” according to their relative similarity—*e.g.*, AT&T postpaid services likely act as better substitutes for Verizon postpaid services than TracFone prepaid services.

1. Absent very large efficiencies, the merger produces significant harm

The IKK model shows that for the merger to be neutral from a consumer welfare standpoint, the combined company would have to achieve at least **END HCI** per subscriber per month in combined efficiencies on average, ranging from about **END HCI**.⁷² In the combined entity, those efficiencies could come from either the T-Mobile side of the business (in which case, the company would need to achieve at least **END HCI** per T-Mobile customer per month in efficiencies), the Sprint side of the business (in which case, the company would need to achieve at least **END HCI** per Sprint customer per month in efficiencies), or some combination of the two.⁷³

Using a merger simulation model, ABH estimates the post-merger equilibrium prices, subscriber shares, and compensating variation⁷⁴ as measures of the consumer harm from the merger. Unlike the IKK model that uses the Applicants’ network engineering model projected **END HCI** years out, ABH uses current usage rates from a sample of U.S. smartphone users. As a result, ABH does not include 5G implementation, but instead assumes network quality improvements and marginal cost reductions that might arise from synergistic efficiencies. Absent any efficiency gains, ABH finds that the merger outcome is “consistent with a reduction in competition.”⁷⁵ After the merger, consumers would be willing to pay **END HCI** on average per month to return to the market conditions they were facing before the merger took place.⁷⁶ This amount is a measure of their consumer harm.

ABH additionally evaluates the competitive effects on market shares and compensating variation for a range of marginal cost efficiencies. For **END HCI** combinations of marginal

⁷² IKK Declaration, p. 32 at Table 2.

⁷³ Efficiency gains of **END HCI** for each firm would also result in welfare neutrality. *See* IKK Declaration, p. 35 at Figure 2. *See also* IKK Declaration, p. 32 at Table 2.

⁷⁴ Compensating variation is the amount that the user would be willing to pay to return to the market conditions they faced before the merger. It is used as a measure of the user’s welfare loss.

⁷⁵ ABH Report, p. 41.

⁷⁶ *Id.*, p. 42 at Exhibit 13.

cost reductions for Sprint and T-Mobile, only {{BEGIN HCI END HCI}} are procompetitive from a shares standpoint, while only {{BEGIN HCI END HCI}} are procompetitive from a compensating variation standpoint.⁷⁷ Again, each of these procompetitive outcomes require large marginal cost reductions for Sprint and/or T-Mobile.

Like IKK, ABH reports the combinations of Sprint and T-Mobile efficiencies needed for the merger to be welfare neutral. These results show that efficiency gains of approximately {{BEGIN HCI END HCI}} from T-Mobile would provide welfare neutrality without any Sprint efficiency gains. Similarly, efficiency gains of approximately {{BEGIN HCI END HCI}} for Sprint would provide welfare neutrality without efficiency gains from T-Mobile. Efficiency gains of about {{BEGIN HCI END HCI}} for each firm would also result in welfare neutrality.⁷⁸ These results corroborate the IKK findings that the merger would reduce consumer welfare without substantial marginal cost and network quality synergistic efficiencies.

The results from a merger simulation that does not account for potential marginal cost reductions and network improvements, of course, predict exaggerated levels of consumer harm. At a minimum, however, that harm sets an admitted baseline that the merger-specific efficiencies must exceed in order for consumers to not be harmed.

2. The claimed efficiencies are insufficient to overcome consumer welfare harm

a) The Applicants' approach

By asserting efficiencies that might emerge years down the road (and by giving them certainty), IKK and ABH attempt to sidestep the certain fact that in the near future consumers will be significantly harmed. IKK and ABH also both assume that the merger will result in substantial efficiencies being achieved, but that is far from certain. Moreover, to properly evaluate the merger, we must consider what would happen if the merger was not consummated. In that scenario, we find that the merging parties would nevertheless be able to achieve many of the same efficiencies.

IKK explores the aggregate welfare implications of the merger through their full-scale network model and merger simulation. This model includes both network improvements and non-network

⁷⁷ *Ibid.*

⁷⁸ *Id.*, p. 43 at Exhibit 14.

B. SIMILAR PAST MOBILE COMMUNICATION MERGERS HAVE LED TO PRICE INCREASES

Prior 4-to-3 mergers between MNOs in foreign jurisdictions serve as natural experiments suggesting that a similar merger in the U.S. would result in higher prices. While limited, the existing evidence on the impact of consolidation beyond four MNOs points to significant price increases. Post-merger evaluations in two different countries carried out by the European Commission illustrates the potential for U.S. price increases.⁹¹ In Austria in 2006, T-Mobile and tele.ring merged to reduce the number of MNOs from 5 to 4. With the required infrastructure divestitures (spectrum and masts), there was no post-merger consumer harm. Further Austrian consolidation, from four MNOs to three, occurred in 2013. This consolidation increased prices 14% to 20%, and prepaid segments with the most light MVNO competition exhibited the largest price increases of 20% to 30%.⁹² Similarly, the 2007 4-to-3 merger between T-Mobile and Orange in the Netherlands, which closely followed a previous 5-to-4 merger in that market, resulted in price increases estimated in the range of 10% to 15%.⁹³

Recent academic research examining data from 33 OECD countries between 2002 and 2014 also finds that more concentrated markets have higher prices.⁹⁴ The authors estimate that a hypothetical 4-to-3 symmetric merger would increase prices by 16.3% on average.⁹⁵

Similar observations are reflected in previous merger responses by the FCC⁹⁶ and DOJ.⁹⁷ In their review of the AT&T/T-Mobile merger in 2011, they concluded that the increased concentration

⁹¹ Luca Agunzzoni, Benno Buehler, Luca Di Martile, Georg Ecker, Ron Kemp, Anton Schwartz, and Robert Sil, “Ex-Post Analysis of Two Mobile Telecom Mergers: T-Mobile/tele.ring in Austria and T-Mobile/Orange in the Netherlands,” Authority for Consumers & Markets, European Commission, 2015.

⁹² “The Austrian Market for Mobile Telecommunication Services to Private Customers: An ex-post Evaluation of the Merges H3G/Orange and TA/Yesss!” Sectoral Inquiry BWB/AW-393, BundesWettbewerbsBehorde 2016, p. 3.

⁹³ Luca Agunzzoni, Benno Buehler, Luca Di Martile, Georg Ecker, Ron Kemp, Anton Schwartz, and Robert Sil, “Ex-Post Analysis of Two Mobile Telecom Mergers: T-Mobile/tele.ring in Austria and T-Mobile/Orange in the Netherlands,” Authority for Consumers & Markets, European Commission, 2015, p. 12.

⁹⁴ See Christos Genakos, Tommaso Valletti, and Frank Verboven, “Evaluating market consolidation in mobile communications,” *Economic Policy* 33(93), September 15, 2015, p. 45.

⁹⁵ *Id.*

⁹⁶ FCC Staff Report.

⁹⁷ Complaint, *U.S. DOJ Antitrust Division v. AT&T Inc., T-Mobile USA, Inc., and Deutsche Telekom AG*, U.S. D.D.C. 1:11-cv-01560, August 31, 2011.

from a 4-to-3 merger was bound to decrease consumer welfare. The FCC noted that “the proposed transaction would increase the risk of coordinated effects by reducing the number of national participants from four to three.”⁹⁸ Opponents of the merger argued that coordination in this market would likely lead to increased prices, as well as decreased consumer choice and innovation.⁹⁹ The FCC concurred, and its analysis concluded that such coordinated effects were likely to result from the transaction.¹⁰⁰ In its suit to block the merger, the DOJ similarly stated that “the reduction in the number of nationwide providers from four to three, likely will lead to lessened competition due to an enhanced risk of anticompetitive coordination.”¹⁰¹ The DOJ noted that the mobile wireless telecommunication services markets are “particularly conducive to coordination,” and that any anticompetitive coordination would result in higher nationwide prices.¹⁰² If the Applicants are permitted to merge, the same results are predicted by experts: decreased consumer welfare, increased potential for anticompetitive coordination, increased prices, decreased consumer choice and innovation, and lessened competition.

**VI. THE MERGER WILL RESULT IN A LOSS OF COMPETITION AND HARM
MVNO CUSTOMERS AT THE WHOLESALE LEVEL**

**A. SPRINT AND T-MOBILE CURRENTLY HAVE INCENTIVES TO PROVIDE ACCESS
TO AN iMVNO ON FAIR TERMS**

Different MNOs have different incentives when it comes to deciding whether to compete in the wholesale market. Although all are active in the wholesale market providing light MVNOs today,

{{BEGIN HCI

END HCI}}.¹⁰³ Sprint and T-Mobile are currently the only viable MNO partners for iMVNOs. The merger of those two companies will mean that iMVNOs have only one potential partner. Worse still, the merger may give the combined company the incentive to exit the iMVNO wholesale market entirely rather than risk competition from iMVNOs at the retail level.

⁹⁸ FCC Staff Report, p. 39.

⁹⁹ *Ibid.*

¹⁰⁰ *Id.*, pp. 39-44.

¹⁰¹ Complaint, *U.S. DOJ Antitrust Division v. AT&T Inc., T-Mobile USA, Inc., and Deutsche Telekom AG*, U.S. D.D.C. 1:11-cv-01560, August 31, 2011, p. 16.

¹⁰² *Ibid.*

¹⁰³ {{BEGIN HCI

END HCI}}.

1. Unlike AT&T and Verizon, Sprint and T-Mobile have incentives to provide commercially attractive iMVNO access

Serving iMVNOs comes with its own advantages and disadvantages that MNOs must consider when deciding whether to serve the iMVNO wholesale market. MNOs will grant iMVNOs access to their networks if the benefits outweigh the costs. The factors that weigh into an MNO's determination of whether to supply an iMVNO include:

- The cost of providing wholesale access, potentially including congestion costs.
- The value of the sales lost by the MNO from retail competition with the iMVNO (otherwise known as “cannibalization”);
- Whether the iMVNO can feasibly serve customer segments that the MNO cannot and therefore expand the MNO's sales; and
- Whether the iMVNO shares complementary assets that can lower the MNO's cost of providing service.

The net impact of these factors will depend on the percentage of the iMVNOs customers that are likely to come from the MNO's customer base. The MNO will generate revenue from its wholesale business for every subscriber that the iMVNO gains, but it will lose revenue from its retail business for every subscriber that switches away from one of the MNO's own plans to the iMVNO. Thus, holding everything else constant, the MNO will have less incentive to grant wholesale access if the iMVNO's service is a closer substitute to the host MNO's service. Likewise, the host MNO will have a greater incentive to grant wholesale access if a large portion of the iMVNO's customers are diverted from rivals or represent new customers. In the case of light MVNOs, the MNOs retain sufficient control to be able to position the light MVNO's product far enough from their own so as not to make them substitutes. This is not the case for iMVNO contracts, under which the iMVNO has control over the positioning of its product and can represent a stronger competitive threat. As a result, MNOs will generally have less incentive to provide iMVNO contracts than to provide light MVNO contracts, but these incentives will also depend on the circumstances of the MNO.

All things being equal, a larger MNO will have more reason to worry about cannibalization from an iMVNO than a smaller MNO. If a new iMVNO entrant draws its customers from all existing MNO competitors based on their market share (such that it would draw 90% of its customers from a competitor with 90% market share), then the bigger an MNO is, the more customers it will lose

to the iMVNO. It is not guaranteed, however, that an MVNO (light MVNO or iMVNO) will attract customers away from the MNOs in accordance with their relative shares in the market. In some cases, an iMVNO may be better able to serve certain consumer segments than the host MNO can by targeting segments that the MNO could not reach. As explained in Section IV.A.2, current light MVNOs typically offer cheaper and lower quality wireless services that MNOs do not reach under their own brands. An MNO may also partner with an iMVNO to benefit from a new profitable market it cannot efficiently serve. For instance, an MNO without a fixed broadband or cable network cannot compete for multiple-play offers that bundle mobile wireless services with fixed connectivity for communications and TV content. If these consumer segments become important and the MNO cannot replicate the bundle, the incentives to grant wholesale access and serve these customers indirectly through an iMVNO agreement will be large. Conversely, if the MNO is able to compete in this profitable segment, it may be more reticent to facilitate the entry of a comparable competitor in its market. Based on these considerations, given the size and characteristics of the four current MNOs, a cable company like Altice is a more attractive partner for Sprint and T-Mobile than for AT&T and Verizon.

In addition, and as illustrated by the case of Altice, the iMVNO partner can offer reciprocal access to its own infrastructure to the MNO. Such access to infrastructure is a particularly important aspect of Altice's current relationship with Sprint. The iMVNO's own infrastructure holdings and other assets are most valuable when they fill in deficiencies in the MNO's own network or enable a lower cost of service. In Altice's agreement with Sprint, Altice offered to build out micro-cells on its own cable strand infrastructure, allowing Sprint to considerably improve its own network coverage density in urban areas and indoors (where Sprint's current coverage is weakest). Altice is also able to provide data backhaul services over its existing fixed broadband infrastructure.

In summary, an MNO will grant wholesale access to its network if the combined value of: (1) the wholesale revenues on the iMVNO's customers captured either from rival wireless providers or as new customers obtaining wireless service for the first time; and (2) the MNO's cost savings from complementary assets or infrastructure that the iMVNO provides; is *greater than* (3) the lost revenues that the iMVNO diverts from the host MNO; and (4) the direct cost of providing network access to the iMVNO. Larger MNOs with a well-developed network and MNOs already offering content on fixed broadband will have markedly less incentives to provide a cable company with an iMVNO contract that would allow them to market a closely competing service.

As the largest MNO players at the retail level, AT&T and Verizon have the most to lose in terms of potential cannibalization by any iMVNO partners. They also have the least to gain in terms of potential network expansion that iMVNO partners can facilitate. Sprint and T-Mobile, on the other hand, have numerous characteristics that increase the pre-merger benefits—and lower the losses—of providing wholesale access to both light MVNOs and iMVNOs compared to AT&T and Verizon.

First, both Sprint and T-Mobile are relatively small compared to AT&T and Verizon. Sprint is the smallest player of the four MNOs with **BEGIN HCI**

END HCI}}.¹⁰⁵ Sprint’s unsteady footing in the retail market increases the attractiveness of wholesale trade as a way to monetize its spectrum and amortize its capacity investment. The need for a wholesale stream of revenue is even more important for Sprint because it has been improving its infrastructure faster than it is able to improve its brand image and its market share.¹⁰⁶ T-Mobile is similarly limited by its size and does not have the same scale or profit as the two biggest carriers. Although T-Mobile has adopted a strategy of aggressive growth in past years, its footprint is still much smaller than the two largest players.

Second, Sprint and T-Mobile have the lowest overall and per-user profits of the MNOs. Sprint and T-Mobile’s annual EBITDA per subscriber in 2016 were respectively \$13.00/month and \$11.80/month. These values are much lower than AT&T’s \$18.30/month and Verizon’s \$22.71/month.¹⁰⁷ The lower an MNO’s profit from its retail users, the lower the benefits of a wholesale agreement need to be for such an agreement to be profitable. Because smaller wholesale gains are needed to compensate for retail customer losses caused by the entry or expansion of a supplied MVNO, an MNO with relatively low retail profits has relatively large incentives to exploit the wholesale market to derive value.

¹⁰⁴ **BEGIN HCI**

END HCI}}.

¹⁰⁵ **BEGIN HCI**

END HCI}} *See also* 20th Mobile Wireless Competition Report, p.

18 at Chart II.B.6.

¹⁰⁶ **BEGIN HCI**

END HCI}}.

¹⁰⁷ 20th Mobile Wireless Competition Report, p. 24 at Table II.D.1.

Third, unlike AT&T and Verizon, Sprint and T-Mobile do not own a significant fixed communication business. This implies that they have fewer legacy services to consider when deciding to adopt or promote novel ways to view content on mobile devices. This makes Sprint and T-Mobile better partners for cable operators trying to move into wireless services because they do not have fixed broadband offerings. AT&T and Verizon, on the other hand, must consider the competitive effects of new iMVNOs services on their broadband services.

Finally, both Sprint and T-Mobile are in need of densification. Sprint suffered from an infrastructure gap that resulted in relatively low coverage and network density.¹⁰⁸ Cable companies are well situated to help MNOs densify their networks by permitting access to the infrastructure used to provide cable. Cable companies own broadband infrastructure and backhaul systems that can support an MNO's densification plan. These advantages are evidenced by the partnership agreement between Sprint and Altice. Sprint benefits from provisions in the agreement with Altice that allow it to use Altice's sites and services to install its own radio equipment and efficiently densify its network in areas where necessary. Sprint advertises that it has increased download speeds in Long Island, for example, by 135% and is now the "most improved network" in New York City and on Long Island (where Altice operates a fixed-broadband service, Optimum).¹⁰⁹

{{BEGIN HCI

END HCI}}.¹¹⁰ This illustrates that

cable companies can be useful partners to MNOs in need of network densification, under certain conditions.

The higher incentives for Sprint and T-Mobile to provide wholesale access to iMVNOs are evident in their relatively high level of wholesale activity. {{BEGIN HCI

¹⁰⁸ See, e.g., Phil Goldstein, "Analysts: Sprint's network spending slowing down, but will soon ramp up with densification efforts," *FierceWireless*, July 6, 2015, accessed December 19, 2018, <https://www.fiercewireless.com/wireless/analysts-sprint-s-network-spending-slowing-down-but-will-soon-ramp-up-densification>.

¹⁰⁹ "Sprint is Most Improved Network in the Big Apple and Faster than AT&T," Sprint press release, August 16, 2018, accessed December 19, 2018, <https://newsroom.sprint.com/sprint-is-most-improved-network-in-big-apple-and-faster-than-att.htm>.

¹¹⁰ {{BEGIN HCI

END HCI}}

END HCI}}.¹¹¹ Together they supply about 60% of the 'light' wholesale connections.¹¹² {{BEGIN HCI

END HCI}}.¹¹⁴

The incentives for an MNO to provide a cable operator with an iMVNO agreement that includes infrastructure access are well summarized in a 2016 internal Sprint presentation.¹¹⁵ This presentation explains that {{BEGIN HCI

END HCI}}.¹¹⁶

Sprint committed to provide access to an iMVNO by signing an agreement with Altice before the merger was announced. {{BEGIN HCI

END HCI}}.¹¹⁷ The merger of T-Mobile and Sprint threatens to change their balance of

¹¹¹ {{BEGIN HCI

END HCI}}.

¹¹² *HBVZ 1*, p. 38.

¹¹³ {{BEGIN HCI

END HCI}}.

¹¹⁴ {{BEGIN HCI
END HCI}}.

¹¹⁵ {{BEGIN HCI

END HCI}}.

¹¹⁶ {{BEGIN HCI
HCI}}.

END

¹¹⁷ {{BEGIN HCI

pros and cons of serving iMVNO wholesale customers. Post-merger, the combined company's incentives will look more like those of AT&T and Verizon, suggesting that they will deteriorate iMVNO access and may eventually abandon the iMVNO wholesale market altogether. The Applicants' merger will thus in all certainty suppress the wholesale market for iMVNO access to wireless services.

2. The Sprint/Altice agreement reflects the favorable alignment of pre-merger incentives

On November 5, 2017, Sprint and Altice signed a {{BEGIN HCI

END HCI}} that established an iMVNO wholesale agreement and set up a partnership for infrastructure deployment. Altice gained access to Sprint's network with full core control at a competitive price and agreed in exchange to support the deployment of Sprint's small cells on its cable backhaul infrastructure.¹¹⁸

For Altice, the benefits of access to Sprint's national RAN network provides Altice the capability to offer a competitive wireless product on par with the national MNOs' offerings when bundled with Altice's existing infrastructure as discussed in Section VI.C.2. For Sprint, Altice enhances the efficiency and quality of Sprint's wireless services. Altice also helps fill Sprint's needs for cellular network densification, traffic backhaul services, and public Wi-Fi hotspots.

Sprint's spectrum holdings also are markedly different than those of its MNO competitors. Out of the four national MNOs, Sprint licenses the most spectrum overall but has by far the lowest amount of low-band spectrum,¹¹⁹ which its MNO rivals use for broad coverage.¹²⁰ Sprint's concentration in mid- and high-band spectrum requires it to deploy more radios overall to obtain comparable

END HCI}}.

¹¹⁸ {{BEGIN HCI

END HCI}}.

¹¹⁹ 20th Mobile Wireless Competition Report, p. 29 at Table II.E.3. Sprint licenses 188.3 population-weighted MHz total compared to AT&T, T-Mobile, and Verizon, which hold 148.4 MHz, 109.7 MHz, and 114.9 MHz respectively. In contrast, Sprint only licenses 13.9 MHz in low-band spectrum, while AT&T, T-Mobile, and Verizon license 55.4 MHz, 40.7 MHz, and 46.9 MHz respectively. The merged Sprint and T-Mobile would hold 54.6 MHz.

¹²⁰ The FCC's 20th Mobile Wireless Competition Report notes that low-band spectrum can be thought of as coverage spectrum, while mid- and high-band spectrum can be thought of as capacity spectrum. *See* 20th Mobile Wireless Competition Report, ¶ 36.

geographic coverage, and this is especially true in urban areas where mid- and high-band frequencies have trouble “penetrating buildings and urban canyons.”¹²¹

{{BEGIN HCI

¹²¹ *Ibid.*

¹²² {{BEGIN HCI END
HCI}}.

¹²³ {{BEGIN HCI END HCI}}.

¹²⁴ {{BEGIN HCI END HCI}}.

¹²⁵ {{BEGIN HCI END
HCI}}.

¹²⁶ See the discussion in Section IV.B.2, particularly footnote 57.

¹²⁷ Prior to the agreement, Sprint paid approximately \$1 billion to its rival MNOs AT&T and Verizon for backhaul services. *See* Sue Marek, “Sprint will use 2.5 GHz spectrum, dark fiber for backhaul to small cells,” *Fierce Wireless*, January 26, 2016, accessed December 5, 2018, <https://www.fiercewireless.com/wireless/sprint-will-use-2-5-ghz-spectrum-dark-fiber-for-backhaul-to-small-cells>.

¹²⁸ {{BEGIN HCI END HCI}}.

¹²⁹ {{BEGIN HCI END HCI}}.

¹³⁰ “Optimum WiFi Hotspots Information,” Optimum, accessed December 5, 2018, <https://www.optimum.net/internet/about-hotspots>.

¹³¹ {{BEGIN HCI “ END HCI}}.

END HCI}}

Sprint’s CFO Tarek Robbiati aptly described the deal as one “where both companies leverage their own assets to deliver what’s important for the other company.”¹³⁵ Further, Sprint’s CEO Marcelo Claude stated Sprint is “incredibly excited to work with Altice USA on this innovative win-win solution that benefits both our companies,” and that the deal is “a unique opportunity to accelerate the work we are doing to massively densify our network.”¹³⁶

As we discuss below, the merger will likely threaten the viability of the Sprint-Altice arrangement and deteriorate the consumer welfare benefits of this ongoing cooperation. Indeed, the press noted that the current agreement was announced only after Sprint and T-Mobile first abandoned merger negotiations in 2017.¹³⁷ {{BEGIN HCI

¹³² {{BEGIN HCI

END HCI}}.

¹³³ {{BEGIN HCI END HCI}} is the average cash cost per user (“CCPU”) for Sprint prepaid and postpaid customers in Q1 of 2018. See Sprint Response to Data Request, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, October 1, 2018, attachment B, item R.

¹³⁴ {{BEGIN HCI

END HCI}}

¹³⁵ See Colin Gibbs, “Sprint: Altice deal lets us cut through red tape of small-cell deployments,” Fierce Wireless, December 7, 2017, accessed December 5, 2018, <https://www.fiercewireless.com/wireless/sprint-altice-deal-enables-us-to-cut-through-red-tape-small-cell-deployments>.

¹³⁶ “Sprint, Altice USA Announce Strategic MVNO Agreement”, Sprint Investor Relations, November 5, 2017, accessed January 4, 2019, <http://investors.sprint.com/news-and-events/press-releases/press-release-details/2017/Sprint-Altice-USA-Announce-Strategic-MVNO-Agreement/>.

¹³⁷ Anjali Athavaley and Parikshit Mishra, “Altice USA, Sprint agree to wireless partnership,” *Reuters*, November 5, 2017, accessed December 5, 2018, <https://www.reuters.com/article/us-sprint-altice-usa/altice-usa-sprint-agree-to-wireless-partnership-idUSKBN1D513H>.

END

HCI}}¹³⁸

B. POST-MERGER COMPETITION TO SUPPLY WHOLESALE ACCESS TO iMVNOS IS HARMED

1. The merged entity will have lower incentives to grant RAN access to an iMVNO

In our simulations below, we employ a model that modifies the IKK approach to allow for iMVNOS and wholesale competition and measures the changed incentives of the Applicants. We find that the merger would ultimately harm consumers.¹³⁹ Specifically, we estimate the profits of the new merged entity to be {{BEGIN HCI END HCI}} if the undisputed portion of the merger efficiencies is factored in.¹⁴⁰

Sprint and T-Mobile themselves describe expanded coverage that the merged entity would have relative to the two standalone firms.¹⁴¹ Though the merged entity would have similar coverage in 5G to standalone T-Mobile, the new operator is expected to “greatly improve” overall coverage for Sprint’s customers.¹⁴² Whereas the new entity is expected to increase standalone T-Mobile’s overall coverage by only 2 million more POPs in 2021 and 1.1 million more in 2024, Sprint’s overall coverage is anticipated to increase by almost 145 million POPs in 2021 and 130 million more covered POPs in 2024.¹⁴³ The Applicants specifically highlight the merged entity’s expanded 5G coverage in rural areas, predicting that the combined entity will increase outdoor wireless coverage to reach 59.4 million rural residents and indoor wireless coverage to 31 million rural residents.¹⁴⁴

¹³⁸ {{BEGIN HCI

END HCI}}.

¹³⁹ We present a detailed analysis in Section VII.

¹⁴⁰ See Table 5.

¹⁴¹ See, e.g., Description of Transaction, Public Interest Statement, and Related Demonstrations, *In the Matter of Applications of T-Mobile US, Inc., and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, June 18, 2018, pp. 18-19 (henceforth “Public Interest Statement”).

¹⁴² Declaration of Neville R. Ray, Attachment B to Public Interest Statement, ¶¶ 38-39 (henceforth “Ray Initial Declaration”). For projected coverage increases by spectrum band and year, see *Id.*, Table 1.

¹⁴³ Ray Initial Declaration, ¶ 39. For projected coverage increases by spectrum band and year, see *Id.*, Table 1.

¹⁴⁴ Public Interest Statement, p. 66. See also Ray Initial Declaration, ¶ 74.

Sprint and T-Mobile expect that the combined firm's 5G network will be deployed to cover two-thirds of the U.S. population.¹⁴⁵

The new entity thus will have a larger and more profitable business at retail, which, in turn, will make the merged firm much less incentivized to engage in the wholesale market because of the risk of cannibalizing its business and losing customers to iMVNO competitors. Accordingly, the "business stealing" risk of an iMVNO providing similar offers to the merged Applicants will be concomitantly higher than for Sprint or T-Mobile separately, due to both the larger profit per retail customer and the larger overlapping footprint of the new operator. Likewise, the benefits to the combined entity from wholesale activity needed to compensate for any potential losses of retail customers will be higher. As it relates to the predicted future competitive environment, this alone will substantially increase the price of wholesale access. Like AT&T and Verizon, the new entity would only provide wholesale access on terms that make it difficult for an iMVNO to supply quality services at attractive prices or, at a minimum, will provide access with sufficient flexibility only at exorbitant prices.

Sprint and T-Mobile argue that by combining their spectrum assets, the combined entity will provide substantially greater capacity for LTE and 5G than the standalone firms.¹⁴⁶ Yet, the new merged entity foresees **{{BEGIN HCI**

END HCI}}¹⁴⁷ Separately, and perhaps contradicting themselves, the Applicants also argue (notwithstanding diminished LTE capacity) that its augmented network capacity means they will "have no incentive to impair MVNOs' ability to put subscribers on New T-Mobile's network" and will "extend [its] maverick behavior to a variety of adjacent services."¹⁴⁸ But, as we have illustrated in the previous sections, MNOs' decisions on the extent and nature of their wholesale activities is not solely driven by capacity utilization considerations. MNOs will only provide wholesale access to MVNOs of any sort that do not threaten their core business in a manner that decreases their overall profitability.

¹⁴⁵ Public Interest Statement, p. 49.

¹⁴⁶ For example, in their Joint Opposition, Sprint and T-Mobile assert, "[w]hile both T-Mobile and Sprint have standalone plans to deploy 5G networks, the New T-Mobile network will be far superior and create expanded capacity and lower costs so that American consumers will pay less and get more." *See* T-Mobile/Sprint Joint Opposition, p. i. *See also Id.*, pp. 2-7; Public Interest Statement, pp. 42-44.

¹⁴⁷ T-Mobile/Sprint Joint Opposition, p. 43 at Table 5. *See also* Reply Declaration of Neville Ray, Appendix B to T-Mobile/Sprint Joint Opposition, ¶ 20 at Table 3.

¹⁴⁸ Public Interest Statement, p. 124.

In this respect, the current “maverick” nature of the Applicants’ incentives will change dramatically. A maverick strategy makes sense where the customer base is small or relatively unprofitable and the potential for customer acquisition is large or profitable—these are the Applicants’ characteristics and strategies in the recent past. By contrast, as a significant player competing for premium brand users with two very established brands that have relatively low levels of churn, the new merged entity will not be facing the same strategic incentives as the current stand-alone operators.¹⁴⁹ When combined, the Applicants will have slightly more market share than AT&T.¹⁵⁰

Moreover, according to Harris Mobile Insights Survey data from the first quarter of 2018, T-Mobile’s aggressive commercial stance seems to mostly affect the branded prepaid segment where it has successfully attracted prepaid switchers from AT&T and Sprint. T-Mobile was **{{BEGIN HCI**

END HCI}}.¹⁵¹ T-Mobile has also made clear its plans to accelerate its move to premium 5G services.

This makes it even more unlikely that Sprint will continue its “maverick strategy” of partnering with cable iMVNOs. As the new merged entity moves into a next generation network with uncertain demand, it is unlikely to grant wholesale access to a potential competitor targeting its premium users. And, although it may well continue to provide (albeit more expensively) wholesale services to resellers and white label or light MVNOs to monetize its capacity, its economic incentives are to act more as a tight oligopolist, along with Verizon and AT&T, in withholding access to their infrastructure from MVNOs.

2. The merged entity will have the incentive and ability to degrade Sprint’s current deal with Altice

T-Mobile executives have indicated that the new merged entity intends to refarm the 2.5 GHz for the deployment of its 5G network and that it will rely mostly on Sprint and T-Mobile PCS and AWS spectrum as well as on Sprint 800 MHz and T-Mobile 600 and 700 MHz spectrum for a dense

¹⁴⁹ An FCC comparison of the churn rates among MNOs shows that AT&T and Verizon generally have lower churn rates than Sprint and T-Mobile. *See* 20th Mobile Wireless Competition Report, p. 18 at Chart II.B.6.

¹⁵⁰ *See* Table 1.

¹⁵¹ Calculations made by HBVZ based on Harris Mobile Insights Survey, January - April 2018, *HBVZ 2 Backup Materials*; *IKK Backup Materials*.

LTE network that would be safe from congestion.¹⁵² Given the relatively slow and uncertain expected uptake of 5G services, the new merged entity would not require fast additional densification of its 2.5 GHz in the way Sprint has envisaged in its partnership with Altice. This change in strategy directly impacts Altice's mobile services development plans and harms Altice's potential wireless customers. It also calls into question the value of Altice completing the investment foreseen in the agreement much faster than scheduled **{{BEGIN HCI**

END HCI}}.

¹⁵² Ray Initial Declaration, ¶ 18.

¹⁵³ **{{BEGIN HCI**

END HCI}}.

¹⁵⁴ **{{BEGIN HCI**

END HCI}}.

¹⁵⁵ **{{BEGIN HCI**

END HCI}}.

¹⁵⁶ **{{BEGIN HCI**

END HCI}}.

3. The merger eliminates all competition to supply wholesale access to iMVNOs

{{BEGIN HCI

END HCI}}. Moreover, the economics of their business makes it unlikely that they will support the competitive entry of a cable company in the mobile wireless communications space. With the merger, iMVNOs, and notably cable companies, will be precluded from getting competitive offers that would enable attractive iMVNO retail offerings.

Both Sprint and T-Mobile currently present viable alternatives to cable companies investing in mobile communications networks. A partnership is likely if the MNO in question is in need of densification and capacity investment in the area of the cable company footprint. Figure 2 and Figure 3 illustrate {{BEGIN HCI

END HCI}}. This corroborates the fact that both carriers have attractive and lucrative opportunities to work with Altice on an iMVNO arrangement. An examination of the footprint of other cable operators across the country suggests that opportunities currently exist for many cable companies to approach both Sprint and T-Mobile with offers for iMVNO deals.¹⁵⁷ {{BEGIN HCI

END HCI}}.¹⁵⁸ If the merger is allowed to proceed, cable operators would, at best, be able to approach only one MNO for reasonable rates, and the loss of an alternative MNO option would result in reduced bargaining power for the operators, which would ultimately lead to higher prices or more service restrictions for final users.

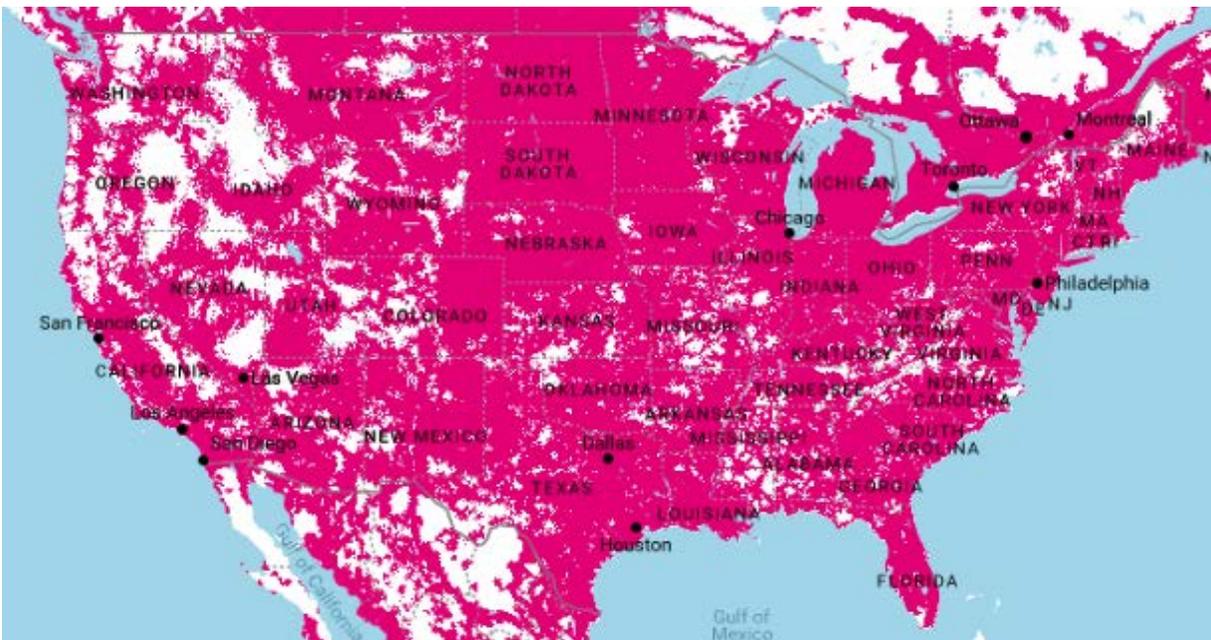
¹⁵⁷ “Cable Availability Maps and Cable Provider Coverage Maps,” CableTV.com, accessed December 12, 2018, <https://www.cabletv.com/blog/cable-availability-maps/>.

¹⁵⁸ {{BEGIN HCI
END HCI}}.

Figure 2: Sprint Coverage / Altice Service Areas
{{BEGIN HCI

END HCI}}

Figure 3: T-Mobile LTE Coverage



Source: "T-Mobile Coverage Map," T-Mobile, accessed December 10, 2018, <https://www.t-mobile.com/coverage/coverage-map>.

C. THE LACK OF COMPETITION FOR IMVNO ACCESS WILL PRODUCE HIGHER CONSUMER HARM THAN CURRENTLY FORESEEN DUE TO THE ELIMINATION OF OTHERWISE LIKELY COMPETITIVE ENTRY

1. *De Novo* entry of another MNO is unlikely and will not mitigate the harm from the merger

The four national MNOs in the United States, which account for the majority of wireless service revenues, wireless subscribers, and available spectrum, have faced increasing demand for data by their customers' desire for unlimited data usage plans, which can be appealing for high-data usage customers when compared to the alternative of paying separately for each gigabyte.¹⁵⁹ This environment makes it difficult for an entrant with a nascent network to obtain the customer base and profitability required to amortize its investment. Under any circumstances, entrants would face significant barriers to entry. Specifically, this industry has high levels of fixed capital investment, large economies of scale present in the sector, already established and recognizable brands, and high regulatory approval costs.

A new national MNO would have to incur substantial capital investments to build out the infrastructure to support a national wireless network and obtain spectrum licenses from the FCC. Over the period 2010 to 2016, the four national MNOs collectively invested approximately \$30 billion annually, on average, in their networks.¹⁶⁰ Other experts in this proceeding have highlighted the high cost of entry.¹⁶¹ They estimate that a national network of cell sites would require about 50,000 sites in addition to the cost of spectrum. In addition, growth in demand for data and evolving technology require regular network upgrades. In 2016 alone, Verizon spent \$11 billion on its infrastructure, the highest amount among the MNOs, and Sprint, which suffers from a capacity gap, spent \$1.7 billion.¹⁶² Figure 4 below illustrates the capital expenditures of the four national MNOs from 2010 to 2016. These investments were just to improve networks and implement new technologies – such as LTE service – and do not include the cost of building a *de novo* network.

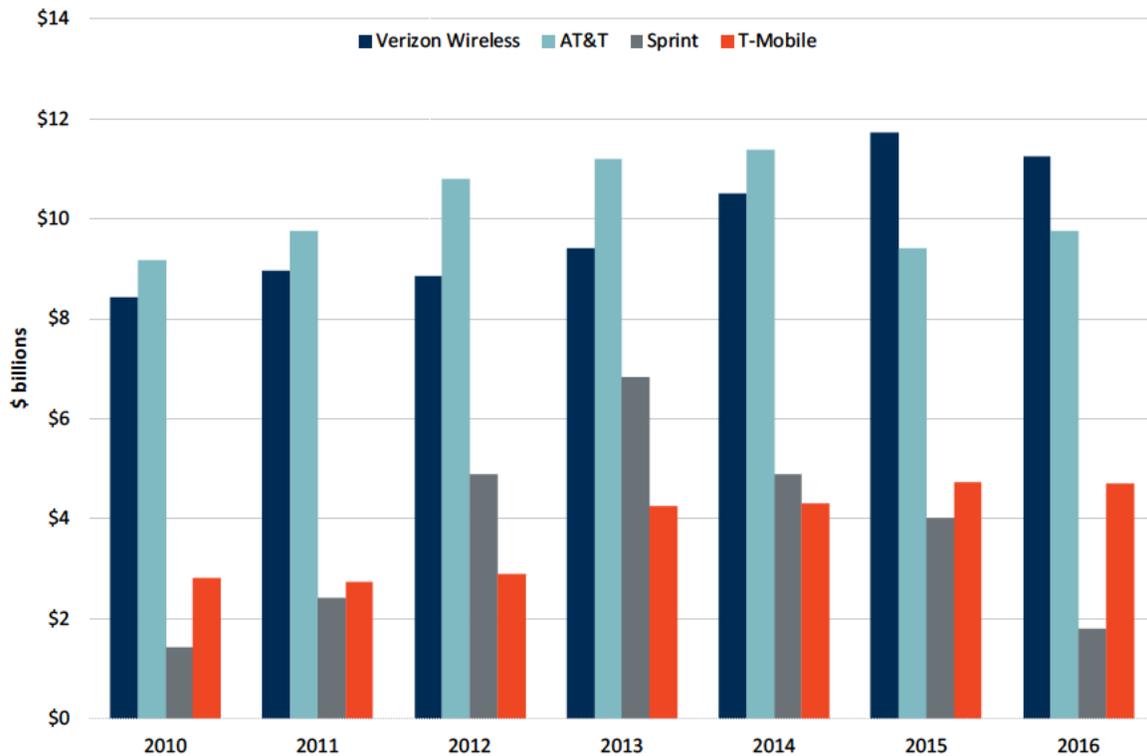
¹⁵⁹ 20th Mobile Wireless Competition Report, ¶ 51.

¹⁶⁰ 20th Mobile Wireless Competition Report, ¶ 7.

¹⁶¹ *HBVZ I*, p. 59

¹⁶² 20th Mobile Wireless Competition Report, p. 48 at Chart III.C.1. AT&T invested \$9.7 billion and T-Mobile invested \$4.7 billion.

Figure 4: Capital Expenditures by Service Provider, 2010 - 2016



Source: 20th Mobile Wireless Competition Report, p. 48 at Chart III.C.1.

A new national MNO would need to acquire the spectrum necessary to provide national wireless service. T-Mobile has \$27 billion worth of spectrum licenses.¹⁶³ AT&T reported that the company submitted winning bids of \$18 billion for licenses in the AWS-3 Auction.¹⁶⁴ The FCC is taking efforts to make spectrum available for potential new competitors.¹⁶⁵ However, new entrants would need to have viable prospects of amortizing the significant costs of spectrum acquisitions. This would require access to a significant customer base, which is challenging in a highly concentrated market of branded players. The four national MNOs held roughly 76% of all spectrum suitable and available for the provision of mobile wireless services as of 2016 but accounted for roughly 98% of mobile wireless revenues in 2016.¹⁶⁶ *De novo* entry also is unlikely from light MVNOs as their small customer base would make it hard to support building infrastructure from scratch, even assuming no response from their host MNO.

¹⁶³ T-Mobile US, Inc., Form 10-K for the Fiscal Year Ended December 31, 2016, p. 68.

¹⁶⁴ AT&T Inc., Form 10-K for the Fiscal Year Ended December 31, 2016, p. 56.

¹⁶⁵ 20th Mobile Wireless Competition Report, Section E.

¹⁶⁶ 20th Mobile Wireless Competition Report, ¶¶ 32, 40.

Although the entry by a completely new firm is unlikely, it is nonetheless possible for an iMVNO operator with an established customer base and pre-existing infrastructure to build into a quality provider of mobile services provided that it has access to existing MNO wireless network capacity at some stage in the buildup. In France, Iliad S.A.'s iMVNO subsidiary Free Mobile, successfully acquired the fourth mobile 3G license for France to develop into an MNO. However, when the company launched in January of 2012, it relied heavily on a roaming and network sharing agreement with Orange-France Télécom, a sizeable incumbent, while it committed to build up infrastructure.¹⁶⁷ Thus, Free Mobile operated “almost purely as an MVNO [iMVNO] with Orange,”¹⁶⁸ while simultaneously building out infrastructure to become a true MNO. Free Mobile's transition under this model has been remarkably successful. After launching with only 5% of the sites compared to its MNO competitors, in five years it built out its infrastructure to reach 50% of the sites and 35% of the capacity compared to the incumbent MNOs.¹⁶⁹ As of December 31, 2017, Free Mobile had 13.7 million mobile subscribers, with a market share of 19%, as a MNO.¹⁷⁰ It currently provides quality coverage to 90% of the French territory and 99% of the population.¹⁷¹

Another example is Fastweb S.p.A, a fiber-optic broadband operator in Italy that launched a light MVNO with operator 3 Italia in 2008.¹⁷² Fastweb transitioned into an iMVNO with operator TIM

¹⁶⁷ “Free Mobile and Orange sign a 2G roaming agreement and agree to extend this to 3G networks,” Iliad press release, March 3, 2011, accessed December 5, 2018, https://www.iliad.fr/presse/2011/CP_030311_Eng.pdf. Dawinderpal Sahota, “Orange France loses patience with Free Mobile,” telecoms.com, February 15, 2012, accessed December 5, 2018, <http://telecoms.com/40031/orange-france-loses-patience-with-free-mobile/>.

¹⁶⁸ **{{BEGIN HCI**
END HCI}}.

¹⁶⁹ **{{BEGIN HCI**
END HCI}}.

¹⁷⁰ “2017 Results, Free subscribers top the 20 million mark, Transition to Ultra-Fast networks firmly underway,” Iliad press release, March 13, 2018, p. 2, accessed December 5, 2018, https://www.iliad.fr/finances/2018/CP_130318_Eng.pdf.

¹⁷¹ See coverage map at Mon Reseau Mobile, accessed December 19, 2018, <https://www.monreseau-mobile.fr/>.

¹⁷² “FASTWEB signs a virtual mobile operator agreement with 3 Italia. The Company will have complete autonomy in the development of the offer and services [translation],” Fastweb, December 6, 2007, accessed December 5, 2018, <https://www.fastweb.it/corporate/media/comunicati-stampa/fastweb-sigla-con-3-italia-un-accordo-di-operatore-mobile-virtuale-la-societa-avra-completa-autonomia-nello-sviluppo-dellofferta-e-dei-servizi/>.

in 2017.¹⁷³ It has now purchased 5G spectrum in major Italian cities, as well as over 800 towers to further build out its network.¹⁷⁴

In sum, the entry of a completely new MNO with no customer base or fixed infrastructure is unlikely to happen in the current environment. Operators coming from the cable business present a possible new presence in the mobile wireless space, but only if they are provided with reasonable wholesale access to the incumbent carrier's wireless networks in order to economically build their wireless footprint over time.

2. Cable companies such as Altice are particularly well placed to become competitive as iMVNOs

Cable companies, including Altice, are uniquely positioned to become successful iMVNOs. Because of their existing infrastructure and customer bases, cable companies face lower costs of entry and can minimize their costs over time.¹⁷⁵ But, critically, the successful gradual buildup of a service that can rival MNOs' offerings requires starting as an iMVNO.

There are many reasons why cable companies benefit from their fixed line infrastructure in the deployment of a mobile communications service. First, a wireless network essentially comprises two broad components: a wireless network, including the towers, radios, and spectrum; and a fixed network necessary to transport traffic over long distances. This fixed network is the backbone of any wireless network and provides backhaul of wireless traffic across the United States, without which, a nationwide wireless network cannot function. Cable companies have already undertaken significant investments in this area and have deployed robust fixed networks within their footprints. Cable operators continue to invest in these networks, upgrading capacity and offering greater speeds to consumers. This fixed infrastructure gives cable companies a significant advantage over other new wireless entrants because cable companies have in place this significant "piece" of a wireless network. It is only with this fixed infrastructure, that cable companies, as

¹⁷³ "The Mobile Network," Fastweb Corporate, Fastweb, accessed December 5, 2018, <https://www.fastweb.it/corporate/azienda/la-rete/?lng=EN>.

¹⁷⁴ "Fastweb acquires 5G spectrum and fixed wireless branch from Tiscali," Swisscom press release, July 30, 2018, accessed December 5, 2018, <https://www.swisscom.ch/en/about/medien/press-releases/2018/07/20180730-mm-fastweb-5g-frequenzen-tiscali.html>.

¹⁷⁵ The potential for cable companies to challenge wireless carriers with Wi-Fi offload and other services is discussed in a working paper funded by T-Mobile by Harold Furchtgott-Roth. See Harold Furchtgott-Roth, "WiFi Helps Define the Relevant Market for Wireless Services," October 2018, pp. 29-30.

iMVNOs, can reduce reliance on their host MNOs, and thereby increase competitive pressures in the wireless market. Additionally, cable companies have in place the necessary agreements and networking infrastructure for interconnection and the delivery of traffic across the United States.

In granting Altice access to numbering resources, the FCC noted that Altice had made the necessary investments to have a wireless core and facilities in place to operate a quality wireless service. Specifically, this is described as owning and operating core mobile network facilities (switches and routers) as well as a service profile management system for end user devices.¹⁷⁶

Second, each leading cable company has an existing and extensive network of Wi-Fi hotspots¹⁷⁷ that can be used to “offload” data traffic from traditional RAN access, thereby avoiding costly per-gigabyte access payments. Wi-Fi can also be used to facilitate voice-over-Wi-Fi technology where calls are seamlessly passed from a traditional LTE RAN to a Wi-Fi connection.

Third, existing outdoor infrastructure can be used efficiently and quickly to add capacity. Installing small cell devices on existing cable wires for MNOs (or for itself, if and when the cable operator acquires spectrum) provides a cost-effective way to add network capacity. The significant cost savings are realized from the cable provider’s ability to both quickly install and cheaply supply these devices with backhaul connectivity over time. Further, unlike traditional cell towers, these installations happen without the need to acquire additional physical infrastructure and without local permitting requirements.

Cable companies also leverage the density of their existing facilities in partnerships with MNOs. They can offer unique complementarity to MNOs wishing to densify their network and build small

¹⁷⁶ Order, *In the Matter of Numbering Policies for Modern Communications Number Resource Optimization*, WC Docket No. 13-97, December 21, 2018, ¶13.

¹⁷⁷ According to company websites, Comcast Xfinity has 18 million Wi-Fi hotspots, Charter Communications’ Spectrum Mobile has over 250,000 hotspots, and Altice’s Optimum has over 2 million Wi-Fi hotspots. See “The Xfinity Mobile Plan,” Xfinity Mobile, accessed December 19, 2018, <https://www.xfinity.com/mobile/plan#by-the-gig>; “Get access to FREE Spectrum WiFi Hotspots in your state,” Spectrum, accessed December 19, 2018, <https://www.spectrum.com/free-wifi-hotspots.html>; “Optimum Wi-Fi hotspots,” Optimum, accessed December 5, 2018, <https://www.optimum.net/internet/hotspots/>.

cell capacity in order to cover densely populated areas.¹⁷⁸ The cable industry also has the densest wired networks in the nation, which facilitates the move into 5G.¹⁷⁹

Moreover, cable companies, including Altice, have sizeable customer bases and existing relationships with people who already subscribe to wireless service from an existing carrier. Cable companies are positioned to realize cost synergies in marketing and the back-office provisioning of wireless services to these customers. As of September 2018, Altice had 4.9 million unique customer relationships in 21 states and a national footprint that passed 8.5 million homes,¹⁸⁰ with more than 50% of their customers residing in the New York metropolitan area.¹⁸¹

3. Absent the merger, Altice has viable plans to expand its wireless infrastructure, becoming comparable to an MNO over time

Because of its core control capabilities, {{BEGIN HCI

END

HCI}}. Through investments, Altice is aligned to quickly grow and become a significant competitor to MNOs in the mobile wireless communications market. Altice voiced these ambitions in its 2018 third-quarter earnings conference call when CEO, Dexter Goei stated:

“We will be operating our own core network with its own [Home Location Register], which is the brain of the mobile network. This means we will manage our own customer base and mobile services, as well as provide our own SIM cards, so we can negotiate costs with our SIM suppliers directly and manage the configuration where we have scale and benefit from a lot of legacy experience in countries outside the U.S. In other words, we are getting ready to operate almost

¹⁷⁸ See, e.g., Sean Kinney, “Cox deal highlights role of cable in Sprint small cell densification plans,” *RCR Wireless News*, January 19, 2018, accessed December 19, 2018, <https://www.rcrwireless.com/20180119/carriers/cox-deal-highlights-role-of-cable-in-sprint-small-cell-plans-tag17>.

¹⁷⁹ Colin Gibbs, “Cable’s infrastructure will ultimately win in wireless,” *Fierce Wireless*, September 28, 2016, accessed December 5, 2018, <https://www.fiercewireless.com/wireless/moffettnathanson-cable-s-infrastructure-will-ultimately-win-wireless>.

¹⁸⁰ Altice USA, Inc., Notice of Ex Parte Presentation, *Petition to Condition or Deny, In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, FCC, September 20, 2018, p. 5.

¹⁸¹ *Ibid.*

like an MNO and will provide a great value proposition to our customers and the market.”¹⁸²

{{BEGIN HCI

END

HCI}}.

Altice is considering spectrum acquisition opportunities and is presently testing the functionality of small cell capacity using CBRS spectrum.¹⁸⁴ Other cable companies have begun acquiring spectrum or are planning capital expenditures. In the April 2018, FCC 600 MHz incentive auction, Comcast spent \$1.7 billion on 10 MHz of spectrum covering roughly 145M POPs in its own footprint across San Francisco, Chicago, Philadelphia, and New York. Cox, the third largest cable operator in the United States, will be participating in the upcoming FCC 24 GHz spectrum auction.¹⁸⁵ However, among these companies, {{BEGIN HCI

END HCI}}.

The iMVNO partnership with Sprint is the critical factor in Altice’s ability to even consider such plans. By providing an affordable source of wireless network access, it allows Altice to manage the risk of future investment decisions. For example, Altice can choose over time which areas of its footprint to build capacity, knowing that it has an available and geographically widespread source of network access through Sprint.

¹⁸² Daniel Frankel, “Altice’s Goei: We’ll Operate Our Mobile Service ‘Like an MNO,’” *Multichannel News*, November 6, 2018, accessed December 4, 2018, <https://www.multichannel.com/news/altice-touts-full-mvno-approach-again>.

¹⁸³ See, e.g., Altice, “Altice Mobile Spectrum Strategy,” presentation, December 20, 2018.

¹⁸⁴ Mike Dano, “Altice: We won’t lose money on mobile,” *FierceWireless*, August 6, 2018, accessed December 3, 2018, <https://www.fiercewireless.com/wireless/altice-we-won-t-lose-money-mobile>.

¹⁸⁵ Daniel Frankel, “Cox the Only Major Cable Operator to Bid in FCC’s First 5G Spectrum Auction,” *Multichannel News*, October 11, 2018, accessed December 5, 2018, <https://www.multichannel.com/news/cox-the-only-major-cable-operator-to-bid-in-fccs-first-5g-spectrum-auction>.

VII. STRUCTURAL MODELS PREDICT THE CONSUMER HARM OF THE MERGER DUE TO THE HARM TO COMPETITION AT BOTH RETAIL AND WHOLESALE IMVNO LEVELS

Applicants and their economists have emphasized the important role cable operators will have on future wireless competition, implying that the harm from the proposed merger will be lessened when future competition from cable operators is considered.¹⁸⁶ Importantly, however, Applicants do not account for cable operators in their formal modeling of wireless competition.¹⁸⁷ In this section, we account for this competition from cable operators by simply incorporating them into the model that Applicants’ economists present in the IKK Declaration (henceforth, “IKK model”). We refer to this IKK model with cable competition as the “extended IKK model.”

Cable operators can enter the mobile communication services space in two ways: as light MVNOs, meaning that they are fully dependent on the MNO for the service provision; or as iMVNOs, meaning that they combine their fixed infrastructure with the wireless infrastructure of the MNO and retain the ability to fully manage the pricing, the wireless product, the routing of network traffic, and their customers’ experience. The contracting MNO ultimately decides whether or not, to provide wholesale services to iMVNOs that have these capabilities and who are not fully dependent on the MNO.

When the merger’s effect on iMVNOs is included in the analysis—which the IKK model ignores—then the effects on consumer welfare are even worse, because the merger worsens the terms on which cable operators can obtain iMVNO agreements. Moreover, the extended model demonstrates that consumers are worse off after the merger than the original IKK model predicts, independently of whether the merged firm grants iMVNO agreements or not.

Our merger simulation model quantifies: (a) the harm to consumers resulting from the merger if iMVNO agreements are foreclosed by the merger and cable companies can only operate as light MVNOs, and (b) the harm to consumers from the merger if iMVNO agreements are granted.¹⁸⁸

¹⁸⁶ See, e.g., Woroch Declaration, pp. 17-19. See also Connolly 2018, §4. See also Harold Furchtgott-Roth, “WiFi Helps Define the Relevant Market for Wireless Services,” October 2018, §II.E.

¹⁸⁷ The formal modeling by Applicants’ economists in the IKK Declaration of the merger’s unilateral competitive effects includes only light MVNOs and does not incorporate iMVNOs.

¹⁸⁸ Importantly, our model endogenously predicts worsened wholesale pricing terms after the merger, increased retail prices, and further consumer harm, even after we account for possible merger-specific cost efficiencies.

We understand that regional cable providers willing to scale up their MVNO services (including Charter and Comcast) share Altice's concerns relating to their ability to provide wireless services as iMVNOs. Our merger simulation models the national penetration of cable companies assuming that, pre-merger, they all obtain an iMVNO on terms similar to those obtained by Altice with Sprint. We do not assume that all cable companies possess the cost and infrastructure advantages that will likely allow Altice to expand very rapidly; instead, we estimate the aggregate growth of a 'generic' cable MVNOs segment based on survey data and assumed adoption rates. We then describe why Altice is likely to outperform this basic scenario.

The details of the model can be found in Appendix I, but some important assumptions are highlighted here.

A. CABLE OPERATORS SEEKING iMVNO ACCESS AND THEIR WIRELESS CONSUMERS ARE HARMED BY THE MERGER

We consider an extended version of the IKK model in which cable operators enter the retail wireless market with the best available wholesale contract. We assume the pre-merger choice is an iMVNO contract with Sprint, such as the one signed by Altice. We then consider two scenarios: a conservative scenario in which the next best alternative (i.e., cable operators' next-best option if it cannot form an iMVNO with Sprint) is an agreement to create a Sprint-hosted light MVNO. In this scenario, we consider the light MVNO to be cable operators' best fallback option both pre- and post-merger. This model captures the impact of the merger on the incentives to grant an iMVNO contract by the new combined entity. We consider another scenario where T-Mobile is also willing to supply an iMVNO wholesale contracts, albeit on worse terms than Sprint, so that wholesale iMVNO competition exists pre-merger. In this case, a T-Mobile iMVNO contract is the fallback option for cable companies pre-merger, but this option is eliminated after the merger. This scenario, presented in detail in Appendix I, takes into account the impact of the loss of wholesale iMVNO competition brought about by the merger, and predicts even larger losses to consumers.¹⁸⁹

In order to model iMVNO wholesale price formation, we refine the IKK framework by introducing a bilateral bargaining process between cable companies and the potential host MNO, where the outcome of the negotiation depends on the relative gains from trade and the relative bargaining

¹⁸⁹ We have also considered alternative outside options available to cable companies, including a Verizon light MVNO agreement, and find similar results.

power available to each party in the negotiation.¹⁹⁰ Within a given agreement, each party's gains from trade equal the difference between the profits it would earn if the agreement were reached at the offered terms and the profits it would earn from the next best alternative – the party's outside option.

Our extended model predicts greater consumer harm than the original IKK model, whether or not iMVNOs are foreclosed. The economic intuition behind this result is grounded in the fact that the combined entity will have an incentive to increase both retail and wholesale prices, including those for iMVNOs. The merged firm's incentives to increase its wholesale iMVNO prices are derived from its incentives to increase its retail prices. Retail prices will increase since the merged firm will now retain customers that the merging parties would have competed for prior to the merger, reducing their incentive to keep retail prices low. Incentives to raise iMVNO wholesale prices are also due to the merged firm's greater ability to recapture customers lost by cable companies that increase their retail prices in the face of higher wholesale costs. Finally, retail price increases resulting from the merger increase the per-customer profitability of retail operations and decrease the incentives to earn wholesale revenues that cannibalize retail sales. These incentives all contribute to increased wholesale prices in a post-merger equilibrium.

Currently, Sprint and T-Mobile do not consider how their retail or wholesale pricing will affect each other's profits: Sprint is not concerned if a decision to lower its prices hurts T-Mobile's profits, and vice-versa. However, after the merger, both Sprint and T-Mobile would internalize how their pricing affects the other's profits, including how their wholesale fees would impact their retail profits and vice-versa. As a combined enterprise, their incentive is to increase both wholesale and retail prices as they no longer have the incentive to attract each other's profitable customers. On the contrary, for any product's price that the merged firm increases it will recapture more of that product's lost sales through increased sales of its other products: that is, the merged entity has an increased ability to recapture lost sales caused by price increases.

Our model describes the impact of these changes in pricing incentives. In this model we assume that cable companies pre-merger obtain an iMVNO contract, which allows them to offer a mobile wireless product that is broadly similar in terms and quality to that of an MNO. **{{BEGIN HCI**

¹⁹⁰ Bargaining power can differ among parties to a negotiation because of differences in the parties' relative patience, fear that negotiations will breakdown, or other asymmetries. Perceived differences in benefits from an agreement are already accounted for by the gains from trade.

END HCI}}, even if the merger does not foreclose iMVNO access. This is roughly {{BEGIN HCI
 END HCI}}¹⁹⁵ more consumer loss than is predicted by the IKK simulation model. The loss in consumer surplus from the merger is much larger, roughly {{BEGIN HCI
 END HCI}}¹⁹⁶ if we assume that the merger forecloses iMVNO access by cable companies and only light MVNO agreements are possible.¹⁹⁷

Table 3: Comparison of Annual Post-Merger Changes in Consumer Surplus before Merger-Specific Cost Efficiencies for 2023
 {{BEGIN HCI

END HCI}}

B. MERGER-SPECIFIC EFFICIENCIES ARE NOT SUFFICIENTLY LARGE TO PREVENT CONSUMER HARM

We further extend the simulation model to account for the marginal cost benefits that Sprint would likely enjoy if it reached iMVNO agreements pre-merger and also account for the portion of IKK’s claimed merger-specific cost efficiencies that are not explicitly discredited by HBVZ’s Reply Declaration.

As previously discussed in Section VI, Sprint benefited from provisions in the agreement with Altice that allowed it to use Altice’s sites and services to install its own radio equipment and efficiently densify its network in areas where it needed to do so. We have quantified the cost benefits that Sprint would enjoy within the Altice service footprint from having an iMVNO with Altice and assume that Sprint would enjoy similar benefits nationally if it adopted iMVNO

¹⁹⁵ {{BEGIN HCI
 END HCI}}. See Table 3.

¹⁹⁶ See Table 3.

¹⁹⁷ This could happen, for example, if the merged entity takes into account dynamic considerations such as future strategic positioning and innovation path.

agreements with other cable operators. Using Sprint’s and Altice’s internal projections, we estimate that these savings imply Sprint’s per-subscriber service costs are about **{{BEGIN HCI
END HCI}}** due to the benefits Altice provides Sprint.¹⁹⁸

Also, as discussed above, many of IKK’s claimed efficiencies have been disputed by HBVZ’s Reply Declaration. HBVZ correct for technical errors and omissions in IKK’s calculations of marginal cost savings attributable to the merger. In particular, HBVZ account for the likely deployment of Massive MIMO antennas, proper quantification of 5G deployment costs and resources, and the value in using millimeter-wave spectrum.¹⁹⁹ Following HBVZ, we adjust IKK’s claimed merger-specific cost saving claims. In particular, after a merger we grant Sprint and T-Mobile’s retail services the cost savings from Table 8 of HBVZ Reply Declaration.²⁰⁰ In addition, we grant the network-specific cost savings from *HBVZ 2* Table 8 to their wholesale (*i.e.*, light MVNO and iMVNO) services.²⁰¹ The HBVZ merger efficiencies applied to our simulation analysis are summarized in Table 4 below.

¹⁹⁸ This figure is based on Sprint’s own valuation of the deal of **{{BEGIN HCI
END HCI}}**. See SPR-FCC-02605506, slide 4. We then use Sprint’s retail and wholesale market shares, as projected by Applicants’ economists and adjusted to incorporate iMVNO market shares pre-merger, and assume that Sprint’s shares are similar within Altice’s footprint to calculate Sprint’s per-subscriber benefits.

¹⁹⁹ *HBVZ 2*, p. 34.

²⁰⁰ For these figures, HBVZ uses Applicants’ economists “relaxed” usage scenario (in which New T-Mobile partially relaxes the data usage restrictions currently imposed by standalone T-Mobile), then adjusts them to include millimeter wave spectrum deployed by the standalone firms for 5G service. To the extent that we do not incorporate HBVZ’s additional adjustments for spectral efficiencies, 5G upgrade costs, and 2.5GHz spectrum refarming, our approach is not a major departure from Applicants’ own model. See *HBVZ 2*, p. 33 at Table 8.

²⁰¹ Table 8 of *HBVZ 2* lists cost savings for retail services. Cost savings are even more minimal for wholesale services, according to Applicants’ backup materials. *HBVZ 2*, p. 33 at Table 8.

Table 4: Merger Efficiencies Based on HBVZ Reply
{{BEGIN HCI

END HCI}}

After accounting for the modest benefits that Sprint would enjoy from an iMVNO agreement and to account for the merger efficiencies that were not discredited by HBVZ, we find that the merger would still result in significant consumer harm; we report these results in Table 5. We show that even if the merger does not foreclose iMVNO access, the combined entity would increase its retail prices post-merger despite the merger efficiencies. Moreover, the merged firm would increase the price charged to cable operators for iMVNO access by roughly **{{BEGIN HCI** **END HCI}}**, which would cause cable iMVNO's retail prices to increase by roughly **{{BEGIN HCI** **END HCI}}**. The net effect of the merger's price increases would be a loss of roughly **{{BEGIN HCI** **END HCI}}** in annual consumer surplus in 2023, even after crediting merger efficiencies. As before, consumer harm is even greater if the merger forecloses iMVNOs completely, leading to about **{{BEGIN HCI** **END HCI}}** in lost consumer surplus in 2023.

Finally, Table 5 also considers the effectiveness of a merger remedy that requires the combined T-Mobile/Sprint to provide cable operators iMVNO access on wholesale terms consistent with Altice's existing contract. This "remedy" scenario still implies a significant loss in consumer surplus from the merger (**{{BEGIN HCI** **END HCI}}**), but does mitigate

the loss by **{{BEGIN HCI** **END HCI}}**²⁰² per year in 2023. That is, a simple iMVNO remedy that preserves the wholesale market status quo pricing terms to cable operators from the Applicants would mitigate about **{{BEGIN HCI** **END HCI}}**²⁰³ of the lost consumer surplus that remained after crediting merger efficiencies.

As noted above, these simulation results are conservative because they capture the merger’s impact due to retail consolidation, but not due to the loss of potential wholesale iMVNO competition between, for example, Sprint and T-Mobile. The Appendix considers the loss of wholesale competition by modeling the merger’s impacts assuming an iMVNO agreement with T-Mobile – albeit on worse terms than the Sprint iMVNO agreement – is the appropriate alternative to an iMVNO contract with Sprint. In this scenario, the model captures the merger’s impact on wholesale competition by removing cable companies’ pre-merger alternative supplier and predicts even larger losses in consumer surplus.

²⁰² **{{BEGIN HCI**

END HCI}}.

²⁰³ **{{BEGIN HCI**

END HCI}}.

**Table 5: Post-Merger Results, 2023,
Including Loss in Wholesale iMVNO Competition,
Sprint iMVNO Cost Benefits, & Merger-Specific Cost Efficiencies
(Light MVNO Outside Option)**

{{BEGIN HCI

END HCI}}

**C. ALTICE'S PLANS FOR DISRUPTIVE ENTRY IN MOBILE WIRELESS SERVICES
SUGGEST AN EVEN GREATER CONSUMER HARM**

The consumer harm from the merger presented above is likely underestimated as it does not factor in the full competitive potential of other cable companies. In our model, cable companies are

treated as broadly equivalent to MNOs in the type of services and commercial terms that they provide. Thanks to more flexible network cost management and the ability to control user experience, iMVNOs will be able to outcompete light MVNOs and target MNOs' customers. But cable companies may also be able to price aggressively if they adopt a bundling strategy that sacrifices wireless margin for more overall revenues due to lower churn or improved user experience in their cable service. {{BEGIN HCI

END HCI}}.

Altice's plan illustrates the cost advantages of possible synergies between fixed and mobile infrastructure. Exploiting those synergies will greatly benefit consumers that have, in some

²⁰⁴ {{BEGIN HCI

END HCI}}.

²⁰⁵ *Id.*

²⁰⁶ {{BEGIN HCI
END HCI}}.

²⁰⁷ *Id.*, pp.13-14.

markets, already embraced quad-play. In France for example, quad-play penetration reached 43% of all households in 2014 after a launch in 2009.²⁰⁸ In the United States, several factors play in favor of rapid adoption of a cable iMVNO wireless service. In addition to the attractive price for quality unlimited plans, evidence from Altice shows that 44 to 49% of cable customers favor the idea of a combined bill with a single carrier for their communications and TV services.²⁰⁹ Comcast's experience shows that, once consumers are exposed to the cable wireless plan, they are more willing to adopt it than predicted by their general attitude towards switching.²¹⁰

Over the long term, other cable companies should be able to exploit some of the advantages available to Altice as an iMVNO. The degradation or possible elimination of iMVNO contracts brought about by the merger would produce even greater losses in consumer welfare if we take into account the full competitive potential of cable iMVNOs.

²⁰⁸ Anne Morris, "Ranking of 5 Leading Quad Play Markets in Western Europe," FierceWireless, September 6, 2015, accessed January 5, 2019, <https://www.fiercewireless.com/special-report/ranking-5-leading-quad-play-markets-western-europe>; "Quad Play Market Strategies in Western Europe: Growth Drivers and Best Practices for Service Providers," Cision, PR Newswire, July 1, 2015, accessed January 5, 2019, <https://www.prnewswire.com/news-releases/quad-play-strategies-in-western-europe-growth-drivers-and-best-practices-for-service-providers-300107821.html>.

²⁰⁹ **{{BEGIN HCI**

END HCI}}.

²¹⁰ Phil Britt, "Report Declares Comcast Quad Play 'Firmly Rooted', With Verizon Being the Biggest Loser," *Telecompetitor*, May 2, 2018, accessed January 5, 2018, <https://www.telecompetitor.com/report-declares-comcast-quad-play-firmly-rooted-with-verizon-being-the-biggest-loser/>. In the Comcast case, the wireless service is provided under a 'light MVNO' contract.

VIII. IF THE MERGER PROCEEDS, LONG-TERM NATIONWIDE WHOLESALE ACCESS GUARANTEES ARE NEEDED TO REDUCE AT LEAST SOME OF THE CONSUMER HARMS

As discussed in Section IV, the proposed merger is anticompetitive, harms consumers, and there is no adequate “fix.” However, if the Applicants were to take affirmative structural steps to try to “fix” some of the harms of the merger, remedies would have to include a preservation of workable iMVNO wholesale access. After the merger, competition from cable companies will at least require: (1) extending durable, robust, commercially reasonable nationwide iMVNO agreements to cable operators; and (2) divesting sufficient spectrum assets to enable iMVNOs to transition or reduce reliance on MNO partners and become, in time, either partially or completely independent of MNOs. The following examines conditions that must be satisfied to mitigate some of the harms of the merger.

A. CABLE COMPANIES’ RETAIL COMPETITION REQUIRES GUARANTEES FOR iMVNO WHOLESALE ACCESS

The agreement between Altice and Sprint presents a unique opportunity for an infrastructure investment partnership, which will be fundamentally disrupted by the merger. Without protections for its iMVNO agreement, Altice will not be in a position to build the necessary infrastructure to rival MNOs in the wireless communications services market in time to prevent entrenchment by MNOs in an increasingly innovative mobile communications space. As explained in Section VI.C.1, the upfront fixed investment of deploying a new mobile network constitutes a barrier to entry. Even if cable companies like Altice already possess backhaul and Wi-Fi infrastructure, they would have to acquire enough spectrum and wireless cellular infrastructure to replace their wholesale arrangement. This represents a slower and more risky proposition.

The reliance on a host MNO’s spectrum and cellular infrastructure is key for a rapid and efficient deployment of a wireless service by cable companies. The ability to optimize across networks to decrease costs is a fundamental part of a cable iMVNO strategy for rapid entry. If cable companies’ plans to enter the mobile services markets as iMVNOs are to remain undisrupted, the Commission must require that the new merged entity preserves pre-merger infrastructure supply. Without determined action, changes in the incentives of the combined MNO are bound to degrade the implementation of the existing agreement and certainly call into question its continuity. As Tucows, Inc., the parent company of MVNO Ting Mobile, noted, “No law or regulation requires the network operator to renew [an MVNO’s existing] contract or to renew it on commercially

reasonable terms... [e]ach MVNO operates under peril that its business could change, or end, if its network provider decided to wind up or substantially alter its MVNO business.”²¹¹

In order to maintain the prospects of competition at retail, it is key to preserve the pre-existing options for capable cable operators to access MNO’s infrastructure to launch mobile wireless communications services. In Altice’s case, it is key to require that Sprint and the merged Applicants maintain the agreement for a sufficient length of time and not degrade Altice’s current access provided to the RAN.

B. ALTICE WILL NOT FULLY DEVELOP AS A MOBILE WIRELESS COMMUNICATION SUPPLIER IF WHOLESALE ACCESS TO INFRASTRUCTURE IS NOT GUARANTEED BEYOND FIVE YEARS

1. Some post-merger conditions would be required for Altice to be able to fully develop as an iMVNO

Future competition from Altice and other MVNOs will not be guaranteed by requiring that the combined entity honor existing commitments alone. Due to a change in the incentives of the new merged entity, to ensure that Altice is able to remain a source of long-term wireless competition the Commission must also condition merger approval on the newly merged Applicants’ (1) committing to provide MVNOs the best wholesale terms and conditions of any existing agreement with Sprint or T-Mobile for ten years; (2) providing its improved nationwide coverage and service offerings to all existing MVNO partners of Sprint and T-Mobile; and (3) divestment of spectrum exceeding the spectrum screen and associated network infrastructure.²¹² The importance of each of these conditions to Altice’s ability to act as a formidable wireless competitor is addressed in turn below.

2. Altice needs contractual access for a period of up to 10 years

To become an effective wireless competitor post-merger, Altice must have long-term access on favorable terms to the merged entity’s RAN. Though the Applicants have indicated that the new

²¹¹ Tucows, Inc., Comment of Ting Mobile, Inc., *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, FCC, August 27, 2018, pp. 8-9.

²¹² Altice, USA, Inc., *Petition to Condition or Deny, In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, August 27, 2018, p. 4 (henceforth “Altice Petition to Condition or Deny”).

merged entity would honor Sprint’s existing agreement with Altice, honoring this “regional, term-limited agreement is not sufficient to ensure long-term, nationwide wireless competition from MVNOs.”²¹³ Indeed, Altice and other MVNOs have argued that long-term competition from MVNOs can only be guaranteed through long-term wholesale contracts.²¹⁴

Applicants’ own expert, Dr. Glenn Woroch, has indicated that typical MVNO-MNO agreements last only between three to four years.²¹⁵ Given, the change in the incentives of the merging parties, the short-term nature of existing agreements renders them insufficient to provide Altice, and other potential iMVNOs, with the necessary risk reduction for the type of capacity investments they intend to make.²¹⁶

3. Altice needs access to a nationwide network during its build up

Applicants themselves have underscored the importance of access to nationwide coverage and long-term agreements for MVNOs to become competitors in the “converging” wireless, broadband, and video markets. In fact, Applicants argue that the proposed merger would not be “a case of going from 4 to 3 wireless companies – there are now at least 7 or 8 big competitors in this converging market.”²¹⁷ However, the MVNOs referenced by Sprint and T-Mobile in their public interest statement are light MVNOs that cannot exert the same competitive pressures as what Altice plans to offer.²¹⁸ Only iMVNOs can provide meaningful competition to current MNOs, but they will only be able to compete at that level if they are granted nationwide coverage at the same technology level as MNOs.

²¹³ Altice, USA, Inc., Reply of Altice, USA, Inc., *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, October 31, 2018, p. 9 (henceforth “Altice Reply”).

²¹⁴ Altice Reply, pp. 10, 13.

²¹⁵ Woroch Declaration, p. 24.

²¹⁶ Altice Reply, pp. 9-10.

²¹⁷ “T-Mobile and Sprint to Combine, Accelerating 5G Innovation & Increasing Competition,” T-Mobile Newsroom, April 29, 2018, accessed December 5, 2018, <https://www.t-mobile.com/news/5gforall>.

²¹⁸ Altice USA, Inc., Notice of Ex Parte Presentation, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, September 20, 2018, pp. 2-3.

4. Altice would benefit from a divestiture of spectrum

An initial review suggests that New T-Mobile will exceed the Federal Communication Commission's spectrum screen in nearly every major market, including 97 of the top 100 CMAs. If New T-Mobile is permitted to consolidate these substantial spectrum holdings, its substantial spectrum concentration will foreclose the possibility of other nationwide operators entering the market, solidifying the market power of the three dominant wireless carriers and leading to the anticompetitive effects discussed above.²¹⁹ Divestiture of the 2.5 GHz band within Altice's footprint would greatly increase the viability of Altice, and other iMVNOs with 2.5 GHz divestiture within their footprints, as meaningful competitors, allowing them to develop faster into full-fledged MNOs.

Our analysis indicates that the merged Applicants' firm (or the other two major MNOs) is unlikely to independently offer commercially reasonable terms to MVNOs in the future²²⁰ because the merged MNOs' incentives are to deny Altice and other MVNOs these agreements. The incentive analysis provided here is consistent with the refusal by T-Mobile leadership to make concrete commitments during congressional testimony about how the merged Applicants will work with MVNOs post-merger.²²¹ Indeed, according to C-Spire, T-Mobile is actively refusing to meet with carriers who have opposed the merger.²²² The merger is certain to greatly diminish retail and wholesale competition in mobile wireless services to the detriment of consumers. Ten years of nationwide iMVNO wholesale access at economically workable terms will allow cable companies grow to provide meaningful competition to MNOs and mitigate consumer harm.

²¹⁹ Altice Petition to Condition or Deny, pp. 22-23.

²²⁰ Altice Petition to Condition or Deny, p. 14.

²²¹ Questions for the Record for John Legere Submitted by Senator Richard Blumenthal, U.S. Senate Committee on the Judiciary, July 11, 2018, p. 6, accessed December 12, 2018, <https://www.judiciary.senate.gov/imo/media/doc/Legere%20Responses%20to%20QFRs.pdf>.

²²² See Letter from Carl W. Northrop, counsel to C Spire, to Marlene Dortch, Secretary, Federal Communications Commission, *In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation Consolidated Applications for Consent to Transfer Control of Licenses and Authorizations*, WT Docket No. 18-197, November 8, 2018.

I declare under the penalty of perjury that the foregoing is true and correct.

Signed

A handwritten signature in black ink, appearing to read "Michael I. Cragg".

Michael I. Cragg

January 25, 2019

A handwritten signature in blue ink, appearing to read "Eliana Garcés".

Eliana Garcés

January 25, 2019

APPENDIX I: MERGER SIMULATION MODEL

A. THE BASELINE IKK MODEL

The IKK merger simulation, as well as HBVZ’s simulation, represents competition among cellular services providers based on a “differentiated Bertrand” model of competition. These models are calibrated by fitting the model’s unknown parameters to a set of assumptions and a limited set of data inputs. This calibration method is typical in merger analysis when high-frequency transaction level data, such as scanner data, are not available to estimate the model’s underlying parameters econometrically.

Our analysis adopts IKK’s merger simulation framework as the foundation for our structural analysis because it provides a baseline for price and consumer effects from the merger, based on a common framework endorsed by the Applicants.

B. EXTENDING THE IKK MODEL TO INCLUDE COMPETITION FROM CABLE OPERATORS

But-for the merger, other cable companies would likely enter into iMVNO agreements with Sprint, and potentially T-Mobile, that are similar to the one Altice currently has. If, however, T-Mobile and Sprint merge, the merged firm’s new incentive would be to only allow such iMVNO agreements at higher prices, if they allow them at all.

Our expanded IKK model explicitly models these predicted changes contract in terms by incorporating an upstream Nash-Bargaining model. We assume that Sprint bargains over the wholesale price it offers to potential cable iMVNOs, and that the price is determined by the standard Nash equilibrium in Nash bargaining (“Nash-in-Nash”) maximization problem:

$$\max_{P^w} (\pi_S(P^w) - \pi_S^0)^{\tau_S} \cdot (\pi_C(P^w) - \pi_C^0)^{1-\tau_S}$$

Here, τ_S reflects Sprint’s bargaining power relative to the cable company—Sprint has a stronger bargaining position as the bargaining parameter approaches one. The first term in parentheses measures Sprint’s profit benefits from an iMVNO partnership (with wholesale price of P^w) in excess of its profits if no agreement is reached; these profits π_S^0 are termed Sprint’s disagreement payoff. We assume these profits occur under a Light MVNO agreement that would be established if no

iMVNO agreement is reached.²²³ The second term in parentheses measures the same difference for cable companies: the profits $\pi_C(P^w)$ that they would earn as iMVNOs (with a wholesale price of P^w), relative to their profits π_C^0 they would earn as a Light MVNO.

Further, because Altice’s concerns – while local to their cable footprint – are shared by other regional cable providers that operate MVNOs (including Charter and Comcast), our merger simulations proceed at the national level rather than within the regional Altice footprint. We also rely on Altice’s information to characterize cable operators’ wireless costs and impute cable operators’ wireless subscribers under alternative scenarios.

1. Cable operator data inputs

We derive estimates of the total number of cable MVNO subscribers, the wholesale price per subscriber paid to the host MNO, the wholesale profit margin per subscriber earned by the MNO, and a per-subscriber allocation of capital expenditures paid by the MVNO to build the core control network infrastructure needed to establish an iMVNO.

In our simulations, we model a nationally-representative cable entity to capture the likely establishment of iMVNOs by major cable operators (such as Altice, Charter, and Comcast) nationwide. To do so, we assume the wholesale prices in the executed Sprint/Altice agreement would also prevail in other pre-merger iMVNO agreements.²²⁴ **{{BEGIN HCI**

²²³ We have also considered alternative outside options available to cable companies, including a Verizon light MVNO agreement, and find similar results.

²²⁴ **{{BEGIN HCI**
END HCI}}.

²²⁵ **{{BEGIN HCI** **END HCI}}.**

²²⁶ The details of these alterations are described below.

²²⁷ **{{BEGIN HCI**

END HCI}}.

END HCI}}. This is a realistic and even conservative assumption, as cable iMVNOs can offer similar services to those of MNOs at favorable prices, similar service quality (See Section IV.B.2.), and a higher level of convenience (e.g. a single bill).

{{BEGIN HCI

END HCI}}.²²⁸

Cable Operators' iMVNO Subscribers: If cable operators obtain complete iMVNO agreements similar to Altice's nationwide, we estimate that in 2023 the total number of subscribers served by cable iMVNOs will be 49 million.²²⁹

Cable Operators' iMVNO Costs: {{BEGIN HCI

²²⁸ {{BEGIN HCI

END HCI}}.

²²⁹ This follows from the assumptions described in Section VII.A {{BEGIN HCI

END HCI}}.

²³⁰ {{BEGIN HCI

END HCI}}; *See*

also Cisco, "Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2016-2021," white paper, February 7, 2017, figure 19; Cisco estimates a global average offload rate of 63% in 2021.

END HCI}}.²³¹

Finally, we sum Altice’s total capital expenditures related to their core control network (as an iMVNO) and their small cell deployment (per their contract terms) incurred over six years, then divide this by the total tonnage of cellular data used during the same period to get a per-gigabyte capital expenditure allocation. We then allocate that cost to each subscriber’s average usage. The resulting per-subscriber weighted average capital expenditure allocation is {{BEGIN HCI
END HCI}}.

Sprint’s iMVNO Costs: We assume the host MNO earns a 50% profit margin in wholesale activity; that is, under the current arrangement, the host MNO incurs a per-subscriber cost of {{BEGIN HCI
END HCI}}.

Cable Light MVNO Assumptions: If instead, cable operators cannot obtain iMVNO agreements and are relegated to reseller-style light MVNOs, we assume that cable MVNOs are only able to capture one-third as many subscribers by {{BEGIN HCI
END HCI}}.

We assume that cable operators would pay wholesale prices for light MVNO access equal to the light MVNO fees charged to TracFone in the IKK model {{BEGIN HCI
END HCI}}.²³² We again assume a 50% wholesale profit margin for the MNOs, so per-subscriber wholesale cost is {{BEGIN HCI
END HCI}}.

2. Calibration of the extended IKK model without wholesale iMVNO competition

Before we can simulate the impacts of the merger in our extended IKK model, we must first specify the structural model’s primitives that are required to characterize cable operators under alternative states of cable competition: cable operators as iMVNO competitors and cable operators as light MVNO competitors.

²³¹ {{BEGIN HCI
HCI}}.

END

²³² This figure is directly from IKK’s model. TracFone is the predominant light MVNO in the market. *See* IKK Backup Materials.

We account for differences in the positioning of the cable competitor’s wireless products under an iMVNO contract versus a light MVNO contract by positioning these products in different product categories, or “nests,” and by calibrating the logit brand strength parameter under each alternative.²³³

When the cable competitor is confined to a light MVNO agreement, we assume that the cable operator’s wireless product is within IKK’s MVNO nest. This assumption is consistent with cable operators’ light MVNO agreements more closely resembling a reseller agreement, not unlike the reseller agreements that other MVNOs have. Alternatively, when the cable competitor has the benefits of an iMVNO agreement, we assume that its wireless product is within IKK’s AT&T/Verizon/US Cellular postpaid nest. This assumption is consistent with cable companies’ postpaid products under iMVNO agreements being close substitutes to MNOs’ postpaid products.²³⁴

Next, we calculate the cable operator’s logit brand parameter that would exist under a light MVNO agreement and then a separate brand parameter that would exist under the iMVNO agreement. This “calibration” solves for these brand parameters by simulating, within the standard IKK model, the entry of either a light MVNO or iMVNO cable operator with the nesting structures, cost structures, and subscriber bases described above.

3. Simulation with an iMVNO hosted on T-Mobile as cable’s outside option

To obtain the results we report in Table 5, we calibrate a bargaining strength parameter based on the assumption that in iMVNO negotiations with Sprint but-for the merger, cable companies’ disagreement profits come from a Sprint-hosted light MVNO. As a robustness check, we also consider the impact of an alternative assumption that cable’s outside option is a T-Mobile-hosted iMVNO. We assume that a T-Mobile iMVNO contract would afford cable companies the same

²³³ For a description of logit nests and brand parameters, *see* IKK Declaration, §II.A. *See also* Luke Froeb, Steven Tschantz, and Gregory J. Werden, “Pass-through Rates and the Price Effects of Mergers,” *International Journal of Industrial Organization* 23 (2005): 703-715.

²³⁴ This assumption also places iMVNOs in a separate nest from Sprint and T-Mobile, which is reasonable since they cannot offer quad-play bundles like AT&T, Verizon, and cable iMVNOs can. It is also a conservative modeling assumption, since placing iMVNOs in the Sprint/T-Mobile nest increases the merged firm’s incentive to foreclose iMVNO access and decreases its ability to steal customers from its rival MNOs in the other nest. Simulations using this alternative nesting structure indeed result in higher prices and lower consumer surplus.

non-price terms as a Sprint iMVNO agreement, but would be priced 50% above Sprint's iMVNO wholesale terms. All other calibration inputs and structures are unchanged. Table 6 reports the results of the merger simulation under this assumption. The only material change is in column [3], which documents post-merger outcomes that depend on the calibrated bargaining parameter. Effectively, Table 6 assumes that Sprint is in a stronger bargaining position relative to the cable companies pre-merger. Consequently, the merger's effects on consumer welfare are even larger in Table 6 than the ones we report in Table 5.

**Table 6: Post-Merger Results, 2023,
Including Loss in Wholesale iMVNO Competition,
Sprint iMVNO Cost Benefits, & Merger-Specific Cost Efficiencies
(T-Mobile iMVNO Outside Option)**

{{BEGIN HCI

END HCI}}

APPENDIX II: CVs

Dr. Michael Cragg is Chairman of The Brattle Group. He is an expert in industrial organization and finance. He has testified in dozens of matters involving competition, market structure, and determining how market power and barriers to entry affect economic profits, and the measurement of costs and revenues.

Dr. Cragg is recognized by Global Competition Review and Who's Who Legal as one of the world's top experts in antitrust. He has assisted corporations, the U.S. Department of Justice, and the FTC in various antitrust and intellectual property matters. He is currently working on the Blue Cross Blue Shield MDL and successfully completed the US Airways versus Sabre case.

Dr. Cragg has over two decades of competition experience dating back to when he first assisted the FTC in the Mylan pharmaceutical matter which resulted in the largest antitrust settlement at the time. Since then he has worked on a range of old and new economy matters. He developed the litigation plan for ten separate experts in various Microsoft litigations. He has been involved in a variety of investigations and matters of market structure dating back to UK deregulation in through the California Energy Crisis and Financial Crisis. He also developed testimony in various MasterCard/Visa/American Express antitrust litigations. In addition, Dr. Cragg has been involved in numerous disputes involving the pharmaceutical industry, medical device, software, IT services and high tech industries.

Dr. Cragg has testified successfully before juries and judges in a variety of very high profile matters. For instance, he recently testified on behalf of AIG shareholders in their successful Takings claim arising from their mistreatment during the Financial Crisis. This involved rebutting the testimony of Hank Paulson, Ben Bernanke and Tim Geithner where the judge relied heavily on his testimony. He is qualified in Federal Court as an expert in competition economics, industrial organization, and financial economics.

Prior to joining The Brattle Group, Dr. Cragg was a founding member of Cambridge Finance Partners, the founding partner for the Boston office of Bates White & Ballentine, and vice president at Analysis Group. Dr. Cragg has served as a management consultant at CFP, A.T. Kearney, and Integral.

Dr. Cragg began his career as a professor at Columbia University and UCLA's Anderson School of Management, where he taught courses in public finance, industrial organization, and econometrics. He has served on the faculty of the World Bank Training Programs, was an economist at RAND, and a senior research economist at the Milken Institute in Santa Monica, CA. Dr. Cragg was President of the Board of Trustees of the Cambridge Montessori School, a pre-K through grade nine school of 250 students. Dr. Cragg is a former Board member for the Children's Advocacy Center of Suffolk County and currently sits on the Board for the BBTS ski club.

EDUCATION

- Ph.D., Economics, Stanford University, 1993
- M.A., University of British Columbia, 1988
- B.S.E., magna cum laude, Princeton University, 1986

AREAS OF EXPERTISE

- Industrial organization
- Competition economics
- Valuation of Intangibles
- Intellectual Property
- Damages
- Antitrust
- Corporate Finance
- Taxation and Public Finance
- Securities Analysis and Valuation
- Structured Finance

Industry Expertise

- Software
- Telecommunications
- Financial Services
- Energy
- Real estate
- Pharmaceuticals
- Medical Devices
- Manufacturing

PROFESSIONAL WORK EXPERIENCE

- Chairman, The Brattle Group 2016-present
- Board of Directors, The Brattle Group 2014 – present
- Chief Operating Officer, The Brattle Group, 2011 – 2013
- Principal, The Brattle Group, 2008 – present
- Founding Partner, Cambridge Finance Partners, LLC, 2001 – 2008
- Partner, Bates White & Ballentine, LLC, 2000 – 2001
- Vice President, Analysis Group/Economics, 1999 - 2000
- Manager, A.T. Kearney, 1998 – 1999

- Visiting Professor, Anderson School of Management, UCLA, 1997
- Senior Research Associate, Milken Institute, 1997 – 1998
- Consultant, RAND, 1996 – 1997
- Assistant Professor, Economics Department, Columbia University 1993 – 1998

EXPERIENCE

Antitrust and Intellectual Property

- Analysis of anticompetitive actions towards US Airways by Sabre
- Injunction actions in microprocessor industry
- Analysis of competition at Chicago O'Hare airport
- Calculation of damages in preliminary injunction hearing involving human resources management software
- Determination of appropriate royalty rate in pharmaceutical dispute involving cancer drugs and stem cell treatment
- Determination of appropriate royalty rate in pharmaceutical dispute involving antiinfective drugs
- Valuation of brand names owned by multinational food distributor
- Conducted economic analysis relevant to class certification in the aggregates industry.
- Retained as consulting expert by the Federal Trade Commission and various states to analyze liability and damages arising out of antitrust claims against Mylan pharmaceuticals regarding exclusive contracts and vertical market foreclosure in the pharmaceutical industry. Case settled with the largest antitrust settlement ever obtained by the FTC.
- Retained as consulting expert analyzing damages in claims that MasterCard and Visa unfairly tied the acceptance of debit cards to acceptance of credit cards. Developed expert rebuttal on damages and liability testimony to Franklin Fischer.
- Testified on adequacy of competition in the market for opium and opiate drugs. Analyzed market structure at all levels of the drug production process from the harvesting of opiate raw materials, to production of API to wholesaling and final distribution.
- Developed expert testimony on profitability and reasonable royalty rates in claim that Genentech infringed UC's patent for technology necessary for producing human growth hormone.
- Provided expert testimony analyzing market definition for generic and branded anti-depressants and anti-anxiety drugs.
- Provided expert testimony on the value of marketing as a barrier to entry in the pharmaceutical industry.
- Consulting expert analyzing market definition for generic and branded anti-depressants and anti-anxiety drugs.

- Analysis of energy withholding and market manipulation during California Energy Crisis.

Securities, Financial Markets and Valuation

- Valuation of various manufacturing and IP assets owned by Eaton and Cooper industries
- Analysis of fraudulent conveyance in precious metals trading and mining operations
- Valuation of medical devices
- Valuation of various brands
- Analysis of irreparable harm in preliminary injunction request by United Air Lines and American Air Lines to halt expansion of Chicago O'Hare airport
- Valuation of complex real estate holdings in Ireland, London, Paris, Boston, San Francisco and New York. Analysis of bank lending and relationships and restructuring of Irish commercial banking sector and sovereign debt markets
- Cramdown analysis in bankruptcy proceedings for real estate partnerships and hedge funds in Hawaii and New York
- Analysis of IPO market in 2007-2010
- Valuation of communications and high tech manufacturer with operations in India, the U.S. and Europe
- Analysis of Goldman Sachs underwriting activities in sale of military equipment manufacturer
- Analysis and valuation of precious metals distributor and lender
- Valuation of various brands owned by multinational food distributor
- Analysis of various international structured finance investments by Lehman Brothers, Citibank, Principal Life, Rabobank, Ambac, AIG, Wells Fargo, Bank of New York, BB&T, Bank of America, Lloyds, Barclays, Credit Agricole
- Analysis of Chicago Tribune LBO and bankruptcy
- Valuation of complex real estate holdings in San Francisco
- Analysis of capital structure of various real estate partnerships holding commercial real estate across a dozen urban areas in the United States
- Analysis of real estate workout involving \$300 million in real estate in bankruptcy
- Analysis of the economic process granting development rights and analysis of the value of development rights for a celebrity enclave on Martha's Vineyard in a multi-jurisdictional dispute between local, state and federal authorities, real estate partnerships and various not-for-profit organizations.
- Analyzed harm from fraudulent accounting and financial information in acquisition of Excell data by Cambridge Technology Partners.

- Valuation of Nashoba Networks, executive stock options and private equity financing of Nashoba Networks.
- Analysis of 3M's cost of capital, capital structure and R&D investment portfolio in dispute regarding appropriate pretrial interest rate in silicone breast implant litigation.
- Analysis of trading costs and hedging efficiency for a major energy producer.
- Analysis of hedging and risk management practices for power plants in the presence of carbon costs (clean and dirty spark spread options, clean and dirty dark spread options).
- Developed benchmark cost of capital measures for a Fortune 100 energy company investigating divestiture and acquisition strategies. Presented results before FERC and in the Electricity Journal.
- Conducted market study of the valuation of mutual fund companies. Study involved collection of comprehensive dataset on sources of fees and the cost structure for mutual fund complexes. Analyzed inflow and outflow patterns from mutual funds as a function of performance.
- Valued intangible assets of a life insurance company that provided annuity and life insurance products. Analysis included industry study on sources of profits, comparables adjustments and discounted cash flow analysis.
- Consulting expert working on behalf of Credit Lyonnais and the French government in a \$6 billion lawsuit brought by the losing bidders for U.S. life insurance company Executive Life, which had failed under the weight of its junk bond holdings. Analysis of loss causation tested whether any of the losing bids satisfied then-California Insurance Commissioner John Garamendi's requirements for protecting policyholders against further losses.
- In the Enron securities litigation provided consulting services and assisted a testifying expert. Analysis included work typical for a 10b(5) securities case including a day-by-day event study, construction of trading models in order to replicate and critique plaintiffs' damages claims, and analyzed financial reports, analysts' reports, stock, bond, and options trading data, and other public information in order to identify curative disclosure events. Valuation work also included indices of industry performance that transformed over time along with the firm's underlying business segments and construction of bottom-up measures of enterprise value.
- Analyzed business model and trading practices of the failed hedge fund Long-Term Capital partners.
- Valued and analyzed risk characteristics of a portfolio of life insurance policies owned by Xcel Energy.
- Analyzed inter-company transfer payments, pre-payment for goods, and related impacts on risk management and, in particular, foreign currency hedging.

- For an investment division of a major insurance company, developed analytical support for negotiation strategy in a tax matter involving foreign currency options. This involved converting transaction documents into cash flow models, and presenting results on multiple occasions to the legal team and the practitioners who entered into the transaction.
- Analyzed the drug development process for 19 distinct drugs in various stages of clinical progress in support of expert testimony on the relative economic value of marketing, development, and patented technology. Modeled the profit split on the potential returns of these drugs between small biotech firms and the large pharmaceutical firms with whom they entered into business alliances.
- Analyzed nine different complex cross-border lease transactions documents. Modeled underlying cash flows from the leasing of thousands of different types of computers including mainframes and telecommunication systems, and tractor trailer. Developed regression models on depreciation rates for computer equipment and residual value analysis.
- Analyzed 12,000 Powder River Basin coal contracts from 1978 through 1993. Developed regression models, including log and linear fixed effect models, to determine the statistical likelihood of renegotiation of the coal contract at issue. The project involved massive data collection and cleansing effort, and formulation and write-up of statistical methodology.
- Developed and performed regression analyses on the sources of value for young biotech firms.
- Performed regression analysis to derive lease yields, discount rates, and depreciation rates on computer equipment.
- For a private client, evaluated malpractice damages in celebrity divorce representation. This included modeling of eschewed settlement offers and effects of potential legal advice errors using several different damage theories.
- Valuation and analysis of a failed bond fund that invested in a variety of instruments including ABS, CDO, MBS, CMBS, CDO-squareds. Presentation to Board and SEC and for settlement.
- Analyzed complex series of real estate transactions as they related to claimed charitable gifts.
- Valuation of coal fired and nuclear power assets.
- Analysis of potential financial distress for a vertically integrated utility experiencing deregulation.
- Valued manufacturing intangibles in Puerto Rican and Dominican Republic and the United States for one of the world's largest electronics and electric components manufacturers.

- Determined mitigation value of land that could be restored to wetlands.
- Analysis of complex real estate transaction involving exclusive property in Massachusetts and abuse of charities.

Securitization and Structured Finance

- Analysis of STARS transactions
- Analysis of CDS portfolios in Ambac bankruptcy
- In the Enron litigation, provided analysis and explanation of several financial structures including securitizations, swaps, derivatives, and other complex structures.
- Analyzed value of bonds backed by credit card receivables.
- Analyzed dozens of leveraged lease and cross border lease transactions.
- Analyzed the pricing and market response to a disputed bond call. Included analysis of comparisons of general obligation bonds, those secured by credit card receivables, and those involving a provision that allowed the client to call the bonds in the event of a large decline in receivables.
- For the DOJ on three cases involving LILLO transactions, encountered the underlying legal issues of economic substance, substance over form and pre-tax business purpose. Provided expert support, including document review, cash flow creation and scenario testing, as well consulting on strategy and case preparation. Examined option exercise scenarios and their sensitivity to various parameters, including interest rates and the value of the underlying assets, as well as potential default scenarios.
- Valuation and analysis of a failed bond fund that invested in a variety of instruments including ABS, CDO, MBS, CMBS, CDO-squareds. Presentation to Board and SEC and for settlement.

Tax Litigation

- Expert reports, deposition, and trial testimony on Coca-Cola transfer pricing
- Expert reports and deposition on AIG STARS matter
- Trial testimony on Wells Fargo STARS matter
- Expert reports on Guidant transfer pricing
- Trial testimony on Eaton's transfer pricing
- Presentation at IRS Appeals on value of customer relationship intangibles in the financial sector
- Presentation at IRS Appeals on intercompany sale of brands
- Presentation at IRS Appeals on restructuring costs in the energy sector
- Presentation at IRS Appeals on value of wetlands

- Presentations at IRS Appeals and audit on 482 issues
- Presentations at IRS Appeals and audit on 936 and other issues related to Puerto Rican entities
- Trial testimony in Fifth Third bank versus the United States involving a structured finance transaction with Barclays Bank
- Trial testimony in Bank of New York versus the United States involving a structured finance transaction with Barclays Bank
- Trial testimony in various partnership tax matters
- Trial testimony in historic tax credit litigation
- Analysis of international structured finance transactions involving investment by Lehman Brothers
- In the Glaxo transfer pricing dispute, testified and supported a team of 6 testifying experts that fully analyzed and presented testimony on the pharmaceutical value chain. Analyzed a dozen different drug markets including migraine, anti-ulcer, and anti-asthma. Analyzed marketing intangibles and the value of pharmaceutical detailing.
- In Long Term Capital Management partnership dispute
- Analysis of international structured finance transactions involving investment by Principal Life Insurance and Citibank
- Xcel Energy v. United States of America was slated to become the fifth Corporate Owned Life Insurance (COLI) case to reach trial. Among the hotly contested issues was the pre-tax profitability and valuation of life insurance policies extending out over 40 years. Finance experts for the taxpayer argued that the policies contributed hundreds of millions in value even absent the contested tax deductions on policy loan interest. Performed valuations and risk analyses for Nobel Prize winner Joseph Stiglitz, who testified that there was no aggregate transfer of risk to the life insurance company.
- For the DOJ on a dispute involving the tax consequences of contingent liabilities and whether a stated amount was taxable, examined underlying contracts and produced econometric models to measure the likelihood of the various contract contingencies arising.
- For the IRS in a tax dispute involving transfer pricing, evaluated the valuation of intangible assets and its impact on the pricing of inter-company transactions.
- Consulted to the investment division of a major insurance company involved in a transaction involving foreign currency transfers. Examined the sources of pre-tax returns to meet economic substance and form over substance standards. Documented and presented the results to the client and legal team.
- Analyzed cross-border leasing transactions examining issues involving the step transaction doctrine, economic substance, substance over form, and pre-tax business purpose.

- *Altria v. United States of America* – Testified in three week trial regarding the economic substance of a leveraged lease transaction. After 28 minutes of deliberation, the jury decided in favor of the government.
- *Fifth Third Bancorp v. United States of America* – Testified in three week trial regarding the economic substance of a leveraged lease transaction. After a short deliberation, the jury decided in favor of the government.
- Valuation of nuclear and coal fired power plants involved in a takings dispute arising from deregulation

PUBLICATIONS

Industrial Organization and Competition Economics

“Insistence – Redefining How We Think of Antitrust”, *Perspectives of Antitrust in Antitrust*, November 2015 by Michael Cragg and Michelle Cleary.

“Are Anticompetitive Innovation Mergers Privately Profitable? An Exploratory Analysis,” by Michael Cragg, Daniel Gaynor, and John Simpson, *Industrial Organization: Regulation, Antitrust & Privatization eJournal*, Vol. 4, No. 121 (August 29, 2012).

“How to Think About Market Manipulation”, by Michael Cragg and Shaun Ledgerwood, *Financier Worldwide*, May 2014.

Corporate Inversion Transactions: Valuations Considerations” by Mike Cragg, Jehan deFonseka, Ryan Tholanikunnel, and Evan Cohen, *Tax Analysts*, June 2015.

“Equity market microstructure and the challenges of regulating HFT” by Michael Cragg and Paul Hinton, *Financier Worldwide*, January 2015.

“Management Control and Privatization in the United Kingdom,” *RAND Journal of Economics* (with I.J. Alexander Dyck), 1999, 30(3) 475-497.

“The Role of Conjoint Surveys In Reasonable Royalty Cases,” by Lisa J. Cameron, Michael I. Cragg, and Daniel L. McFadden, *Law 360, Inc.*, October 16, 2013

“Making The Most of Document Analytics”, by Michael Cragg, Rand Ghayad, Paul Hinton, Mark Sarro, and David Cohen, *Law 360*, December 1, 2015.

Analysis of Fiscal Policy

“Evaluating the Impact of an Offshore Reinsurance Tax,” by Michael Cragg, Bin Zhou, Jehan deFonseka and Lawrence Powell, *Tax Notes*, March 2017.

“The Impact of Offshore Affiliate Reinsurance Tax Proposals on the U.S. Insurance Market,” by Michael Cragg, Bin Zhou, Jehan deFonseka and Lawrence Powell, a report by *The Brattle Group* prepared for the Association of Bermuda Insurers and Reinsurers, January 2017.

“Elections and the Economy: What to do about Recessions?”, by Michael Cragg, Rand Ghayad and Frank Pinter, *Economists’ Voice*, December 2016.

“Corporate Inversion Transactions: Valuations Considerations” by Mike Cragg, Jehan deFonseka, Ryan Tholanikunnel, and Evan Cohen, *Tax Analysts*, June 2015.

“An Economic Framework for Identifying the Tested Party”, by Michael Cragg and David Hutchings *Tax Notes*, November 30, 2015.

“Growing apart: The Evolution of Income and Wealth Inequality”, by Michael Cragg and Rand Ghayad, *The Economists’ Voice*, June 10, 2015.

“Inequities in Tax Policy,” by Michael Cragg and Rand Ghayad, *The Huffington Post*, May 4, 2015,

“Statistical review of US macronutrient consumption data, 1965–2011: Americans have been following dietary guidelines, coincident with the rise in obesity”, by Michael Cragg, Evan Cohen, Jehan deFonseka, Adele Hite, Melanie Rosenberg, and Bin Zhou, *Nutrition Journal*, May 2015.

“Equity market microstructure and the challenges of regulating HFT” by Michael Cragg and Paul Hinton, *Financier Worldwide*, January 2015.

“How to Think About Market Manipulation”, by Michael Cragg and Shaun Ledgerwood, *Financier Worldwide*, May 2014.

“Stockholders”, by Michael Cragg, *Wiley Encyclopedia of Management 3e*, May 2014.

“The European Debt Crisis and the Role of the European Central Bank,” by Michael Cragg, Jehan deFonseka, George Oldfield, and Natalia Piqueria, The Brattle Group, Inc., November 2012.

“Are Anticompetitive Innovation Mergers Privately Profitable? An Exploratory Analysis,” by Michael Cragg, Daniel Gaynor, and John Simpson, *Industrial Organization: Regulation, Antitrust & Privatization eJournal*, Vol. 4, No. 121 (August 29, 2012).

“What should be done about the Long Term Budget Crisis?” edited volume with R. Glenn Hubbard and Joseph E. Stiglitz, 2012.

“Should the Government Invest, or Try to Spur Private Investment?” by Michael Cragg and Joseph Stiglitz, *The Economists’ Voice*, May 2011.

“ECB-IMF Deal is a Noose that will Strangle Economic Recovery,” by Michael Cragg and Joseph Stiglitz, *The Irish Times*, April 9, 2011.

“Understanding the Credit Crisis Part 2: Getting Down the Mountain” 2009 No. 2 (Finance), The Brattle Group.

"The Impact on the U.S. Insurance Market of a Tax on Offshore Affiliate Reinsurance: An Economic Analysis," by Michael I. Cragg, J. David Cummins, and Bin Zhou, The Brattle Group, Inc., May 1, 2009.

“Performance Incentives in the Public Sector: Evidence from the Job Training Partnership Act,” *Journal of Law, Economics and Organization*, 1997, 13(1) 141-168.

“Do We Care? A Study of Canada's Indirect Tax System,” *Canadian Journal of Economics*, 1991, 24(1), pp. 124-43.

City of Los Angeles Industrial Base and Taxes: Report to the City of Los Angeles. *Milken Institute*, 1997. (with Beverly Burr).

“The Use of Welfare in Canada,” *Canadian Journal of Economics*, 1996, 29(0), S25-32.

“The Dynamics of Welfare Participation,” in *Labour Markets and Income Support*, published by the Canadian Employment Research Forum, 1994.

“An Untold Story: The Characteristics of Welfare Use in British Columbia,” *Canadian Journal of Economics*, (with Garry Barrett), 1998, 31(1) pp. 165-188.

“Do Homeless Shelter Conditions Determine Shelter Population? The Case of the Dinkins Deluge,” *Journal of Urban Economics*, 46(3), November 1999, 377-415 (with Brendan O'Flaherty).

Finance and Corporate Governance

“The Interaction of Managerial and Tax Transfer Pricing,” by Michael Cragg, Bin Zhou, Rand Ghayad and Shannon Anderson, *Bloomberg BNA*, February 2017.

“The Social and Economic Contributions of the Life Insurance Industry,” Michael Cragg, David Cummins, Jehan deFonseka, Bin Zhou, October 2016.

“Corporate Inversion Transactions: Valuations Considerations” by Mike Cragg, Jehan deFonseka, Ryan Tholanikunnel, and Evan Cohen, *Tax Analysts*, June 2015.

“The Role of Conjoint Surveys In Reasonable Royalty Cases,” by Lisa J. Cameron, Michael I. Cragg, and Daniel L. McFadden, *Law 360*, Inc., October 16, 2013

“Cleaning Up Spark Spreads: How Plant Owners Can Reduce Risk Through Carbon Markets,” by Michael I. Cragg, Richard E. Goldberg, Varoujan Khatchatrian, and Jehan DeFonseka, The Brattle Group, Inc., March 2011

"The Impact on the U.S. Insurance Market of H.R. 3424 on Offshore Affiliate Reinsurance," by Michael I. Cragg and Bin Zhou, *Law 360*, Inc., July 8, 2010

"The Impact on the U.S. Insurance Market of H.R. 3424 on Offshore Affiliate Reinsurance: An Updated Economic Analysis," by Michael I. Cragg, J. David Cummins, and Bin Zhou, The Brattle Group, Inc., July 8, 2010

"Life Boats for the Banks—Let the Holding Companies Swim," *The Economists' Voice*, May 2009 (with George Oldfield).

"Understanding the Credit Crisis: The Treasury, the Fed, and the Banking System," with George Oldfield, The Brattle Group Finance Newsletter, Issue 01 September 2008, (with George Oldfield).

"Assessing the Cost of Capital for a Standalone Transmission Company," *The Electricity Journal*, 14(1), January 2001, 80-88, (with William Lehr and Ron Rudkin).

"Executive Pay and UK Privatization: The Demise of "One Country, Two Systems," (with Alexander Dyck), *Journal of Business Research*, 2000, 47(1), 3-18.

"Management Control and Privatization in the United Kingdom," *RAND Journal of Economics* (with I.J. Alexander Dyck), 1999, 30(3) 475-497.

Environmental

"Wetland Policy and Urban Growth in the San Francisco Bay Area: Constraints, Conflicts, and Consequences," by Michael Cragg, Steve Polasky, and Christine Polek, *SSRN*, October 12, 2012.

"Valuing Properties with Wetland Potential," by Michael Cragg, Steve Polasky, and Christine Polek, *The Appraisal Journal*, Spring 2011. Awarded Best Paper of the Year.

"Can the U.S. Congressional Ethanol Mandate be Met?," by Metin Celebi, Evan Cohen, Michael I. Cragg, David Hutchings, and Minal Shankar, The Brattle Group, Inc., May 2010.

"The Congressional Politics of Climate Change," *Vox*, 10 June 2009, <http://www.voxeu.org/index.php?q=node/3643>, (with Matthew E. Kahn).

"Carbon Geography: The Political Economy of Congressional Support for Legislation Intended to Mitigate Greenhouse Gas Production," May, 2009 *National Bureau of Economic Research*, paper 14963 (with Matthew E. Kahn).

"Climate Consumption and Climate Pricing from 1940 to 1990," *Regional Science and Urban Economics* (with Matthew E. Kahn), 1999, 29(4), pages 519-39.

"New Estimates of Climate Demand: Evidence from Location Choice," *Journal of Urban Economics* (with Matthew Kahn) 1997 42(2) 261-284.

PRESENTATIONS

Presentations at various institutions and universities including, Harvard Law School, the Federal Reserve Bank of New York, Joint Committee on Tax, IRS, U.S. Treasury, Institutional Investor, RAND, Milken Institute, Columbia University, University of Chicago, Carnegie-Mellon University, Yale University, University of California at Los Angeles, University of California at Berkeley, University of California at San Diego, New York University, Princeton University, University of Toronto.

Transfer Pricing Challenge - Panel Member, *NABE Transfer Pricing Symposium*, Washington, D.C., July 2017

“Defending Transfer Pricing Controversies”, *Bloomberg BNA*, New York, NY December 2016

“The Great Transfer Pricing Debate”, *NABE Transfer Pricing Symposium*, Arlington, VA, July 2015

“The Role of Bargaining Power in TP: What is it? How Should it be Incorporated in TP Analyses? ” *NABE Transfer Pricing Symposium*, Washington, DC 2014

“Super-Normal Profits, Intangibles, and Tax Policy: The Role of Economics,” *NABE Transfer Pricing Symposium*, Arlington, VA, 2013

“Presenting Better Evidence in Reasonable Royalty Cases: The Use of Economic Analysis,” *American Bar Association Annual Meetings*, Toronto 2011

“Update on Renewable Energy Market Trends,” *Seminar on Financing Clean Energy Projects under the Reinvestment Act of 2009*, (organized by Environment Business Council of New England), June 11, 2009

United States Congress Joint Committee on Taxation, White House Domestic Policy Council, and White House Council of Economic Advisors “Analysis of Reinsurance Markets and the Reinsurance Tax Proposal,” various meetings in 2009

University of Toronto, Rottman School of Management, “Foundations of the Credit Crisis, January, 2009

Various CLE presentations to law firms, “Understanding the Credit Crisis: The Treasury, the Fed, and the Banking System,” Fall 2008

ABA Tax and Real Property Joint CLE Meeting, “Court Procedure and Practice, Treatment of Testifying and non-Testifying Experts” Oct. 19-21, Denver, CO 2006

Institutional Investor, “Hedge Funds, Abusive Tax Shelters and the IRS: Is Your Hedge Fund at Risk?” October 28, 2004

Institute for International Relations conference titled *New Approaches to Value Analysis: EVA, Real Options and ROV*, New York, December, 1999, "Real Options: Applications in New Drug Development."

American Economics Association, Boston, Winter 1999, "Fat Cats or Corporate Agents?"

American Economics Association, Chicago, Winter 1998, "Management Control and Privatization in the United Kingdom: A Quiet Life Disturbed."

TESTIMONY

Qualified in federal court as an expert on valuation, microeconomics, financial markets, corporate finance, public finance, structured finance, industrial organization, antitrust, and intellectual property.

AIG v. The United States (2010-2017 affidavits, report, rebuttal reports, deposition)
United States District Court for the Southern District of New York

The Coca-Cola Company v. Commissioner of Internal Revenue (2017 reports)
United States Tax Court

Boston Scientific v. Commissioner of Internal Revenue (2016 reports and rebuttal reports)
United States Tax Court

Wells Fargo & Co. v. The United States (2011-2016, affidavit, report, rebuttal reports, deposition, trial testimony)
United States District Court for the District of Minnesota

General Electric Company & Subsidiaries v. United States of America (2016 report, rebuttal report, deposition)
United States District Court of Connecticut

Eaton Corporation and Subsidiaries v. Commissioner of Internal Revenue (2015 report, rebuttal report, trial testimony)
United States Tax Court

RERI Holdings I, LLC, Jeff Blau Tax Matters Partner v. Commissioner of Internal Revenue (2015 report, rebuttal report, trial testimony)
United States Tax Court

Starr International v. United States of America (2014 report, surrebuttal report, deposition, trial testimony)
United States Court of Federal Claims

LFG Liquidation Trust v. Ernst & Young, LLP, (2014 report, rebuttal report, deposition, testimony trial)
CPR Non-Administered Arbitration

Kearney Partners Fund, LLC, v. United States of America (2011-2013 report, rebuttal report, deposition, trial testimony)

United States District Court for the Middle District of Florida, Fort Myers Division

Buyuk LLC, et al., v. Commissioner of Internal Revenue (2012-2013, report, trial testimony)

United States Tax Court

United States of America v. Fesum Ogbazion, et al., (2013, report, supplemental report, deposition, trial testimony)

United States District Court for the Southern District of Ohio Western Division

Salem Financial, Inc., v. The United States (2011-2013, affidavit, report, rebuttal reports, deposition, trial testimony)

United States Court of Federal Claim

Lehman Brothers Holdings, Inc. and Official Committee of Unsecured Creditors of Lehman Brothers Holdings, Inc., et al., v. United States of America (2012-2013, report, rebuttal report, deposition)

United States District Court for the Southern District of New York

Meda AB, v. 3M Company, 3M Innovative Properties Company, and Riker Laboratories, Inc. (2012-2013, report, rebuttal report, deposition, trial testimony)

United States District Court for the Southern District of New York

Treasury Holdings et al., v. National Asset Management Agency et al., (2012, written testimony)

The High Court, Judicial Review, Ireland

Santander Holdings USA, Inc., et al., v. United States of America (2012, affidavit, report, rebuttal reports, deposition)

United States District Court for the District of Massachusetts

Bank of New York Mellon Corp., v. Commissioner of Internal Revenue (2011-2012, report, rebuttal report, deposition, trial testimony)

United States Tax Court

Wells Fargo, et al. v. United States of America (2011-2012, affidavits, report, rebuttal reports, deposition)

United States District Court for the District of Minnesota

Ambac et al. v. United States of America (2011, report)

United States District Court for the Southern District of New York

AD Global FX, et al. v. United States of America (2011, report, deposition)

United States District Court for the Southern District of New York

United Air Lines, Inc. and American Airlines, Inc. v. City of Chicago (2011, disclosure)
In the Circuit Court of Cook County, Illinois, Chancery Division

Pritired 1, LLC, Principal Life Insurance et al. v United States of America (2009-2010, report, rebuttal report, deposition, trial testimony)
United States District Court for the Southern District of Iowa, Central Division

Dellway et al., v. National Asset Management Agency, Ireland and the Attorney General, (2010, written testimony and rebuttal)
The Supreme Court and the High Court, Commercial, Ireland

In re: Maluhia One, LLC, Maluhia Eight, LLC and Maluhia Nine, LLC (2010, disclosure, trial testimony)
In the United States Bankruptcy Court for the Northern District of Texas, Dallas Division

Highroads, Inc. v. Hewitt Associates, LLC (2010, report, rebuttal report)
Suffolk, SS. Superior Court, Commonwealth of Massachusetts

Eltek et al. v. Lehman Brothers et al. (2010, report)
Arbitration Institute of Stockholm Chamber of Commerce

Duchossois Industries v. United States of America (2009, report, rebuttal report, deposition)
United States District Court for the Northern District of Illinois, Eastern Division

Historic Boardwalk Hall, LLC et al. v Commissioner of Internal Revenue (2009, trial testimony)
United States Tax Court, New York

Altria Group Inc. v. United States of America (2009, report, rebuttal report, deposition, trial)
United States District Court for the Southern District of New York

Fifth Third Bancorp v. United States of America (2008, report, rebuttal report, trial)
United States District Court for the Southern District of Ohio Western Division

Eliana Garcés

Principal, Washington, DC

+1.202.955.5050

Eliana.Garces@brattle.com

REDACTED - PUBLIC COMMENT INSPECTION



Dr. Eliana Garcés is an economist with broad experience in antitrust enforcement and regulatory design. She was in the cabinet of Vice President Joaquín Almunia, the European Commissioner responsible for competition policy in 2010-2014. In that position she supervised antitrust and merger investigations in financial services, information technology, telecommunications, and media.

Dr. Garcés is an expert in mergers and antitrust matters, having worked for 12 years at a technical level in the Chief Economist Team at the European Commission and at a policy level as part of the Competition Commissioners' personal staff. Prior to joining The Brattle Group, Dr. Garcés spent two years as the Deputy Chief Economist in the European Commission's Directorate General for Internal Market and Industry. Dr. Garcés has held positions in both government and the private sector, including economic consulting experience in the United States.

From 2016 to 2017, she was a Visiting Senior Fellow at George Mason University, where she taught and researched regulatory aspects affecting digital platform businesses both in the United States and Europe.

As a member of the Chief Economist Team at the European Commission, Dr. Garcés conducted the empirical analysis of antitrust and mergers investigations, mainly in the areas of media and telecommunications. During her tenure in the cabinet of the Competition Commissioner, she advised the Commissioner on the economic assessment of merger and conduct cases in the areas of telecommunications, digital platforms, energy, and financial services. In her later role as Deputy Chief Economist in the Directorate General for Internal Market and Industry at the European Commission, she participated directly in the discussions surrounding regulatory concerns raised by digital platforms. She has written and spoken extensively about antitrust issues, and notably on innovation and digital platforms. She is the co-author of a widely used textbook "Quantitative Techniques for Competition and Antitrust Analysis" published by Princeton University Press.

EDUCATION

University of California, Los Angeles, Ph.D. in Economics

College of Europe (Brussels), M.A. in European Economic Integration

Universidad Autónoma (Madrid), Licenciatura in Economics and Economic Theory

PROFESSIONAL EXPERIENCE

- 9/2017 - The Brattle Group**
Principal
Providing expertise in regulatory and antitrust cases in the EU and the US, particularly in matters involving the impact of technology.
- 08/2016 - George Mason University – School of Government and Policy - Arlington, VA**
08/2017 Visiting senior fellow
Conducted research for the European Commission and taught a master's degree course on the regulatory aspects of digital innovation.
- 2013-2017 European Commission – Directorate General for Internal Market and Industry**
Deputy Chief Economist
Designed and implemented policies to raise investment and productivity in the European Union. Carried out regulatory assessments of digital platform conduct. Led the Commission negotiations in international fora in the field of essential patents licensing.
- 2010-2013 European Commission**
Member of Cabinet of Joaquin Almunia, Vice-President of the European Commission, European Commissioner for Competition Policy
In charge of antitrust and merger investigations in markets of financial services, information technology, telecommunications and energy. Provided economic advice to the Commissioner relating to these cases. Contributed to the European Commission's policy and regulatory initiatives in financial services and digital markets. In charge of the VP's contribution to the High Level Economic Dialogue with China.
- 2007-2010 European Commission**
Member of Cabinet of Meglena Kuneva, European Commissioner for Consumer Policy
In charge of formulating and implementing new initiatives in the field of consumer policy. Entirely developed a new aspect of the portfolio relating to digital markets advocating measures addressing the commercial use of personal data, online pricing behavior, and cross border restrictions to e-commerce. Coordinated cross border enforcement actions. Advised the Commissioner on competition and internal market policies.
- 2004-2007 European Commission**
Member of the Chief Economist Team - Directorate General of Competition
Part of a small team under the supervision of the Chief Economist to provide the European Commission with economic analysis for merger and antitrust investigations. Participated in working groups on guidelines for the implementation of competition policy. Responsible for the in-house development of empirical analysis expertise, resulting in the publication of a textbook.
- 2001-2004 Economic Analysis LLC - Antitrust Economic Consulting - Los Angeles, U.S.A.**
Economist
Contributed to economic expert reports in the context of antitrust litigation in the U.S.

SELECTED CASE EXPERIENCE

- Report on the impact of regulatory intervention in card payment systems for a client (2018)
- Declaration in the matter of belN Sports, LLC v Comcast Cable Communications, LLC and Comcast Corporation before the Federal Communications Commission (2018)
- Head of the European Commission delegation to review policy guidelines in the matter of the licensing of standard essential patents in the standard setting organizations ETSI and ITU (2013-2016).
- Economic advice in the context of the European Commission regulatory guidance in 'A European agenda for the collaborative economy' (2015-2016)
- Economic advice to the European Commissioner, management of case process in the investigation against Samsung and Google Motorola related to the recourse to injunctions in the enforcement of Standard Essential Patents (2013)
- Economic advice to the European Commissioner in the matter of Google Search and managing the settlement negotiations on behalf of the Commissioner (2010-2013)
- Economic advice to the European Commissioner in the pre-investigation of the Google Android matter (2010-2013)
- Economic advice to the European Commissioner, management of case process in the steel industry merger Outokumpu / Inxum (2013)
- Economic advice to the European Commissioner, management of case process in the case of e-books MFN clauses against Apple and publishers (2013)
- Economic advice to the European Commissioner, management of case process in the merger Universal Music Group / EMI Music (2013)
- Economic advice to the European Commissioner and management of the case process in the matter of VISA interchange fees (2010-2013)
- Economic advice to the European Commissioner, management of case process in UTC/Goodrich (2013)
- Economic advice to the European Commissioner for Competition, management of case process, and presentation of the economic rationale for the prohibition decision to the European Commission College of Commissioners in the notified merger of Deutsche Börse / NYSE Euronext (2012)
- Economic advice to the European Commissioner in the excessive price investigation against Reuter Instrument Codes (2012)
- Economic advice to the European Commissioner, management of case process in the mergers T-Mobile / Orange (2010) and Hutchinson 3 / Orange (Austria) (2012)
- Economic advice to the European Commissioner in the merger Intel / McAfee (2011)
- Economic advice to the European Commissioner, management of case process in the video-conferencing technology merger Cisco / Tanberg (2010)
- Economic advice to the European Commissioner, management of case process in the investigation against E.ON for foreclosure in the market of gas. (2010)
- Economic advice to the European Commissioner in the matter of long term electricity contracts (France).
- Empirical analysis of margin squeeze in the European Commission investigation of Telefonica Spain (2006)
- Empirical analysis in the merger investigation of Sony/BMG (2005)

SELECTED PUBLICATIONS

- Garcés, E and Fanaras, D. (2018) “Antitrust, Privacy, and Digital Platforms’ use of Big Data: A Brief Overview” - forthcoming in Competition, California Lawyers’ Association, Fall 2018
- Garcés-Tolon, E (2017) “The Dynamics of Platform Business Value Creation,” Competition Policy International - Antitrust Chronicle. August 2017.
- Garcés, E (2013) “Licensing of Standard Essential Patents: Antitrust Intervention Is Not Big Enough A Fix,” Competition Policy International, Vol. 9 (2).
- Garcés, E (2012) “An Introduction to Whinston’s classical article on Tying, Foreclosure and Exclusion,” Competition Policy International, Vol. 8 (2).
- Garcés, E. (2010) “The Impact of Behavioral Economics on Consumer and Competition Policies,” Competition Policy International, Vol. 6 (1) pp. 145-152.
- Garcés E., Neven D., and Seabright P. (2009) “The Ups and Downs of the Doctrine of Collective Dominance: Using Game Theory for Merger Policy” in Cases in European Competition Policy: The Economic Analysis, Bruce Lyons (ed.) Cambridge University Press.
- Davis P. and Garcés E., (2009) Quantitative Methods in Antitrust and Competition Analysis, Princeton University Press. (book)
- Garcés E., Thomas D., and Currie, J. (2002) “Longer-Term Effects of Head Start” American Economic Review Vol. 92, no. 4, pp.999-1012.

RECENT SPEAKING ENGAGEMENTS ON INNOVATION AND DIGITAL MARKETS

- CCIA Conference ‘Challenges to Antitrust in a Changing Economy’ – Harvard Law School – November 2018
- EU Competition Law Summit – Ithaca, Greece – August 2018
- Australia Competition and Consumer Commission – Brisbane – August 2018
- CRESSE International Conference on Competition and Regulation – Crete – June 2018
- American Antitrust Institute – Digital Platform Roundtable – Washington DC – March 2018
- Global Competition Review Live – Washington DC – November 2017
- Fordham Antitrust Economics Workshop - New York – September 2017
- WWWforEurope – European Parliament Breakfast – February 2016
- Global Competition Review Live – Miami – February 2016
- European Internet Forum – Brussels – December 2015
- Five Freedoms Project Launch Event, alongside Jakob Wallenberg, Peter Sutherland, and Pascal Lamy - Brussels – November 2015

REDACTED