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Re: United States v. Deutsche Telekom AG, et al., No. 1:19-cv-02232-TJK

TUNNEY ACT COMMENTS OF THE COMMUNICATIONS WORKERS OF AMERICA

Introduction.

The proposed Final Judgment (“PFJ”) violates a number of clearly articulated Antitrust Division policies on merger remedies. These policies, incorporated in current policy guidance documents and in speeches by Division officials, are aimed at ensuring that antitrust remedies are *appropriate, effective and principled*. The remedy here satisfies none of these goals. The Division has not articulated any reasons, let alone principled reasons, why it has turned its back on its own merger remedy policies in this case, many of which are long-standing and represent sound antitrust enforcement.

The Division has recently and successfully asserted a number of its merger remedy policies in litigated cases as a basis for rejecting proposed fixes to anticompetitive mergers, including one in which the proposed divestiture package did not include the *network* necessary for the buyer successfully to compete. That has particular relevance here.

Judged from the standpoint of the competitive harm alleged in the Complaint, the divestiture assets do not restore the competition lost by the elimination of Sprint as an independent competitor *under the theories of harm alleged in the complaint and in the product market alleged in the complaint*. The divestitures create a Mobile Virtual Network Operator (“MVNO”), but the theories of harm and market definition treat competition from MVNOs as de minimis. There is a mismatch between the theory of harm and the divestitures.

Contrary to Division policy, the remedy also fails *promptly* to restore the competition lost due to the merger. The PFJ envisions a period of time measured not in months, but in years, during which the divestiture buyer would be entirely or largely reliant on the merged

firm for network access and would be a customer and reseller, not a full-fledged competitor. For as long as three years, the merged firm is required to provide billing, customer care, SIM card procurement, device provisioning, and other services to the buyer as “transition” services. The exceptionally long “transition” period is necessitated because the divestitures are not of an existing business entity but rather are a collection of asset carve-outs. This scenario creates heightened execution risk and excessive entanglements, both of which are contrary to Division policy goals.

The core provisions of the remedy are not divestitures at all but rather the sharing of the “New T-Mobile” network with the divestiture buyer for a minimum of seven years under a mobile virtual network operator agreement. This is the portion of the remedy that is intended to give the buyer time to transition from a customer to a competitor – or, in the Division’s words, “to facilitate DISH building its own mobile wireless network with which it will compete in the retail mobile wireless service market.” Whether it will ever accomplish that goal is questionable. But what it will accomplish beyond any reasonable doubt is to cement a *multiyear business relationship between the buyer and the merged company that would require extensive government oversight* – exactly the sort of remedy Division leadership has strongly, and persuasively, argued is ineffective as a matter of enforcement policy and, moreover, one that inappropriately puts a law enforcement agency into a regulatory role it is ill-suited to perform.

In summary, based strictly on the allegations in the Complaint, the buyer, during the years it operates as an MVNO, would not put significant competitive pressure on the merged firm or any of the other remaining Mobile Network Operators (“MNOs”); *a fortiori*, it would not replace the competitive pressure the Division alleges Sprint currently exerts in the relevant market.

Leaving aside the remedy’s significant deviations from Division policy, DISH as buyer fails the Division’s standard test for a divestiture buyer. DISH lacks “managerial, operational, technical, and financial capability” to “compete effectively” in the relevant market. The buyer in this case fails on every score – it lacks financial resources of its own and has not secured third-party funding; it has management that has not built a wireless network despite the legal obligation to do so; and it has no experience or demonstrated technical ability to operate such a network, the challenges of which are extensive. (The operational and technical challenges are discussed in the accompanying Declaration of Andrew Afflerbach.) At the same time, DISH has shown a willingness to abuse a federal program to obtain over \$3 billion in taxpayer-funded discounts, and thereby to make “a mockery of the small business program” in the words of then-Commissioner Ajit Pai.

T-Mobile itself highlighted DISH’s lack of fitness as a buyer in an FCC filing in March, 2019, commenting that DISH has a track record of price increases for its services, speculative warehousing of spectrum, and failing to meet FCC-imposed deadlines. T-Mobile additionally

commented that *“DISH stands out for its efforts to game the regulatory system”* and *“has little interest in actually delivering real 5G service.”*

Even assuming for the sake of argument that a weak and otherwise unacceptable buyer could somehow transform into a strong competitor at some future date, the remedy provides insufficient incentives (positive or negative) for this transformation to take place.

From an engineering standpoint, there are numerous perils and pitfalls that the PFJ ignores which stand between the desire to create a new competitive retail wireless network and realization of that goal. These include activating infrastructure at tens of thousands of sites while relying on technologies that do not yet exist, creating and managing a large new team in a tight labor environment, getting permitting approvals and third-party consents, coordinating with T-Mobile (itself in the process of an ambitious build, drawing on a significant amount of expertise and network build capacity), handling procurement, and financing a project costing over ten billion dollars. Furthermore, because DISH is required to operate on a shared infrastructure with T-Mobile, it would need to rely on T-Mobile to make modifications to support new services (e.g., advanced streaming platforms, multimedia broadcast). In coordinating with T-Mobile, it may need to disclose sensitive intellectual property to a competitor to make the changes.

Moreover, the commitments DISH has made are far more limited than they appear at first blush. DISH is required to serve only 70 percent of the population by 2023 – and only at 35 Mbps. This speed is already exceeded in many 4G-served areas (including by Sprint) and represents a very low goal for 5G service. If 35 Mbps is the typical speed of the DISH network in 2023, while the other three facilities-based wireless carriers offer service in hundreds of Mbps – and if this limitation is a baked-in technological limit because of fewer sites or less capacity per site – the result will not be a bona fide fourth network, but a niche network closer to the limited internet of things (IoT) network proposed by DISH prior to the T-Mobile deal.

From a financial standpoint, DISH’s incentives run counter to the Division’s goal of creating a competitively significant new entrant. Several prominent analysts who have examined DISH’s incentives have pointed to: (a) the enormous financial challenges of building a competitive 5G retail network; (b) the fact that DISH may be better served financially by remaining an MVNO customer of T-Mobile rather than building a competitive network; and (c) the incentives DISH has to provide services outside of the relevant market (e.g. wholesale services) even if it does build a network.

For example, a research analyst at Guggenheim Securities wrote: “We continue to see many possible outcomes for DISH that are unlikely to result in a multi-billion dollar network build to end up a sub-scale distant fourth provider with a handful of prepaid subscribers.” A CFRA analyst noted: “[W]e remain skeptical on the potential financial, technical and regulatory hurdles” DISH faces in entering the market. And Deutsche Bank Research analysts wrote: “We don’t believe that DISH’s strategy has been focused in any meaningful way on consumer

wireless, at least not for the past few years. Instead, the company has focused on a Neutral Host wholesale model, which would allow clients to own and manage their own slice of the network through virtualization and to fully control and provision their company's own applications and services." *The failure of the buyer to satisfy basic Division requirements for a divestiture buyer, and the lack of adequate incentives for the buyer to compete in the relevant market, violate long-standing Division policy.*

Finally, Division policy recognizes that complex remedies carrying a high risk of failure are antithetical to Congress's determination that risks to the public should be small. The "MVNO-to-iMVNO-to-MNO" model may be facially attractive, but as the accompanying Declaration of Dr. Afflerbach explains, and recent experience in Europe demonstrates, the reality is that this model is extraordinarily complex, full of risks, and may not be a profitable strategy. There is evidence both in the Complaint and in the FCC record of the substantial harm the public would bear in the event that the remedy fails to create a viable fourth competitor – harm estimated by the Division to be in the *billions* of dollars annually.

Under any reasonable definition of the "public interest," a remedy that carries a high risk of failure and exposes the public to substantial economic harm if it fails cannot be said to be in the "public interest." The Division should exercise its power under Paragraph IV(A) of the Stipulation and Order to withdraw its consent to the entry of the PFJ.

1. Antitrust Division policy requires merger remedies to be "appropriate, effective, and principled" – the PFJ violates all of these basic tenets.

The PFJ violates a number of clearly articulated Antitrust Division policies on merger remedies.¹

On the most fundamental level, Division policy mandates that any merger remedy must adhere to three basic tenets. As stated in the 2004 Merger Remedies Guide: "Remedial provisions in Division decrees must be *appropriate, effective, and principled.*"² The use of the word "must" shows that these characteristics are not optional. The remedy here violates all of these basic tenets.

In order to be "appropriate," a remedy must address the competitive harm alleged in the complaint. The government is obligated to insure that "the remedy fits the violation and flows from the theory of competitive harm."³ Stated otherwise, "[t]here must be a significant

¹ Sources of Antitrust Division merger remedy policies include: (a) U.S. DEP'T OF JUSTICE, ANTITRUST DIVISION POLICY GUIDE TO MERGER REMEDIES (2004) ("2004 Merger Remedies Guide"), <https://www.justice.gov/atr/page/file/1175136/download>; (b) speeches, testimony and other public statements of Division officials, see ANTITRUST DIVISION MANUAL (Fifth Edition) at III-21 ("Other sources of Division policy include the public statements of Division officials"), <https://www.justice.gov/atr/file/761166/download>; and (c) court filings by the United States that include statements about Division policy.

² 2004 Merger Remedies Guide at 2.

³ *Id.* at 3-4.

nexus between the proposed transaction, the nature of the competitive harm, and the proposed remedial provisions.”⁴

In this case, the Amended Complaint contains a summary of the Division’s theory of harm. The merger would “eliminate Sprint as an independent competitor” in the national market for retail mobile wireless service, thereby “reducing the number of national facilities-based mobile wireless carriers from four to three.”⁵ The elimination of Sprint as an independent competitor would cause the merged firm to “compete less aggressively” and “likely would make it easier for the three remaining national facilities-based mobile wireless carriers to coordinate their pricing, promotions, and service offerings.”⁶ The result would be “increased prices and less attractive service offerings for American consumers, who collectively would pay billions of dollars more each year for mobile wireless service.”⁷

Sprint is characterized as an “independent competitor” and one of four “national facilities-based mobile wireless carriers.” There is no suggestion anywhere in the Amended Complaint that carriers without their own networks (Mobile Virtual Network Operators or MVNOs) are competitively significant market participants in the relevant market alleged in the Amended Complaint. Indeed, paragraph 16 suggests the opposite: “Post-merger, the combined share of T-Mobile and Sprint would account for roughly one-third of the national retail mobile wireless service market, leaving only two other national wireless carriers of roughly equal size (AT&T and Verizon).” In other words, the four facilities-based competitors are the only competitively significant firms in the market as alleged. There is no suggestion anywhere in the Amended Complaint that MVNOs would or could constrain the post-merger price increases the Division has predicted or that they would or could disrupt the coordinated effects the Division has alleged.

A complaint that alleges competitive harm in one relevant market is not appropriately remedied by divestitures that enable a buyer to participate in a different market, as a competitively insignificant force in the relevant market alleged in the complaint, and unable to constrain the asserted competitive harm.

In order to be “effective,” a remedy must restore the competition lost through the merger.⁸ That is the only acceptable goal of a merger remedy.⁹ The 2004 Merger Remedies

⁴ *Id.* at 2.

⁵ Complaint ¶¶ 5, 14, 15.

⁶ Complaint ¶ 5.

⁷ Complaint ¶ 5.

⁸ Sprint has \$33.6 billion in annual revenue, \$12.8 billion in annual EBITDA, \$84.6 billion in assets, \$21.2 billion property, plant, and equipment, 28,500 employees, 300 million POPs, 46,000 towers, 30,000 small cells, 1,500 massive MIMO radios, 14 MHz in 800 MHz band, 40 MHz in the 1.9 GHz band, and 150 MHz in the 2.5 GHz band (varies by location), 54.5 million subscribers, including 28.4 million postpaid, 8.8 million prepaid, and 12.9 million wholesale. In contrast, DISH has \$13.4 billion in annual revenue, \$2.8 billion in annual EBITDA, \$31.7 billion in assets, \$2.6 billion in property, plant, and equipment, 16,000 employees, 10-40 MHz in the 600 MHz band, 6 MHz

Guide uses the word “effective” dozens of times, including in a quotation from the Supreme Court: “The relief in an antitrust case must be ‘effective to redress the violations’ and ‘to restore competition.’ . . .”¹⁰

There are two dimensions of remedial effectiveness we focus on here: First, a divestiture remedy “must include all assets necessary for the purchaser to be an effective, long-term competitor.”¹¹ Second, the remedy must allow the purchaser “to compete effectively in a timely fashion.”¹² The first of these requirements takes a long term view, the second looks at the near term. The remedy fails on both scores.

The assets to be divested do not include a fully operational standalone network with a core and spectrum, which is the critical asset that differentiates an independent, competitively significant mobile network operator (MNO) from a dependent, competitively insignificant MVNO.¹³

In *United States v. Aetna and Humana*, the Division alleged that the lack of a network (in that case, a provider network) was a key reason for rejecting the partial asset divestiture proposed by the parties as a remedy. The Division also highlighted the difference between an “independent competitor” and one dependent on the merged entity. As the Division alleged in its complaint:

60. The buyer would not be an independent competitor as Humana is today. The proposed remedy would leave the buyer dependent on Aetna—potentially for years—for providing basic services. Since the buyer would not have a healthcare provider network in place or be acquiring an intact business unit that would enable it to operate on its own, it would have to rely on Aetna’s healthcare provider network and receive administrative services from Aetna for a lengthy period. Because the buyer would receive only limited assets, the buyer would be highly unlikely to timely replicate Aetna’s and Humana’s existing provider networks and competitive strengths in the relevant markets.¹⁴

This case illustrates the problem with a divestiture that lacks a key asset that cannot be readily obtained or duplicated by the buyer. Without that asset, the buyer cannot compete in the relevant market. The absence of a critical asset in this case is even more significant than in the

in 700 MHz band, 70 MHz in the AWS band, and no wireless subscribers. Sprint’s leverage ratio is 2.6x compared to DISH at 6x (Source: CapitalIQ for LTM 12 months ending in March 31, 2019; DISH leverage ratio: Bank of America).

⁹ 2004 Merger Remedies Guide at 4 (“restoring competition is the only appropriate goal with respect to crafting merger remedies”).

¹⁰ 2004 Merger Remedies Guide at 9 n.13 (quoting *Ford Motor Co. v. United States*, 405 U.S. 562, 573 (1972)).

¹¹ 2004 Merger Remedies Guide at 9.

¹² *Id.*

¹³ See 2004 Merger Remedies Guide at 15 n.21 (“A critical asset is one that is necessary for the purchaser to compete effectively in the market in question.”).

¹⁴ Complaint, *United States et al. v. Aetna Inc. and Humana Inc.*, Case 1:16-cv-01494 (July 21, 2016), available at <https://www.justice.gov/atr/file/878196/download>.

Aetna case: If anything, it is far more difficult and challenging for a divestiture purchaser to create a nationwide wireless network than a healthcare provider network. The remedy here significantly departs from Division policy that a divestiture must include all of the assets necessary for the purchaser to be an effective, long-term competitor. (We discuss several other reasons to doubt that the purchaser would ever become an effective long-term competitor in the relevant market later in these comments.)

The timeliness of a remedy is also critical. Per Division policy, the remedy must “restore[] premerger competition to the marketplace as soon as possible.”¹⁵ Deputy Assistant Attorney General Barry Nigro emphasized this point in a speech in 2018: “[T]he goal of a divestiture is not to simply remove the offending combination; rather, it is to promote and protect competition by preserving the status quo competitive dynamic in the market from day one.”¹⁶ The Division has explained the rationale behind this policy as follows:

A quick divestiture has two clear benefits. First, it restores premerger competition to the marketplace as soon as possible. Second, it mitigates the potential dissipation of asset value associated with a lengthy divestiture process.¹⁷

The PFJ dramatically departs from the long-standing Division policy that an effective remedy must *quickly* restore the lost competition in the relevant market alleged in the complaint. Here, the remedy envisions a multiyear process whereby the divestiture buyer may, someday, transform from an MVNO into an “Infrastructure MVNO” (iMVNO) and then into an MNO. At that point, assuming it ever arrives, the remedy would “restore premerger competition to the marketplace” and “protect competition by preserving the competitive dynamic in the market.” But it is indisputable that this result, assuming it occurs at all, will take years. The remedy will not restore competition “quickly,” let alone on “day one.” In the interim, subscribers to the buyer’s prepaid wireless service may go elsewhere, eliminating one of the asserted benefits of transferring these customers. Further, while Sprint currently has postpaid as well as prepaid customers, the remedy does nothing to enable the divestiture buyer quickly to enter the postpaid segment of the market, which is the more profitable segment.

Finally, the remedy in this case includes non-contract (prepaid) customers, limited intellectual property rights, and assets that are not freely transferable but require decommissioning and third-party consents.

In sum, the remedy in this case lacks the fundamental characteristics the Division requires, as a matter of policy, in an “effective” remedy.

¹⁵ 2004 Merger Remedies Guide at 29.

¹⁶ Deputy Assistant Attorney General Barry Nigro Delivers Remarks at the Annual Antitrust Law Leaders Forum in Miami, Florida (February 2, 2018), available at <https://www.justice.gov/opa/speech/deputy-assistant-attorney-general-barry-nigro-delivers-remarks-annual-antitrust-law>.

¹⁷ 2004 Merger Remedies Guide at 29.

The remedy is not “principled.” One of the guiding principles of merger remedies is that “[t]he remedy should promote competition, not competitors.”¹⁸ As the 2004 Merger Remedies Guide states: “Because the goal is reestablishing competition — rather than determining outcomes or picking winners and losers — decree provisions should promote competition generally rather than protect or favor particular competitors.”¹⁹

Senator Mike Lee has raised questions about the Division’s adherence to this guiding principle. As Senator Lee has stated, “I have concerns whenever government joins hands with industry to cobble together a would-be competitor, particularly one who so stridently opposed the merger earlier this year.”²⁰ Doing so “will no doubt invite similar gamesmanship in future antitrust reviews.”²¹ The remedy attempts to cobble together an entirely new wireless competitor. The selection of DISH as that would-be new competitor raises questions about whether the Division is carrying out its law enforcement mandate or is stepping outside of its role.

DISH has been a persistent and vocal opponent of the proposed merger from the beginning. It has submitted detailed economic evidence rebutting the parties’ claims that the transaction would be procompetitive. As recently as March, T-Mobile asserted that “DISH has little interest in actually delivering real 5G service and its private pecuniary interest is to delay or block those who would actually do so.”²² In the same month, T-Mobile accused DISH’s economists of fabricating data.²³ Now the parties have reached an accommodation with each other. The deal joins the two companies at the hip for up to seven years, ridding T-Mobile of a thorn in its side. The deal also would delay yet again FCC network deployment deadlines that DISH must meet, ridding DISH of the prospect of spectrum forfeiture.

The issue is not whether the Division has the authority to approve a proposed purchaser. Of course it does. Division policies relevant to the review and approval of a purchaser are discussed later in these comments, and particularly the “fitness” test for the buyer and the requirement that “the Division must be certain that the purchaser has the incentive to use the divestiture assets to compete in the relevant market.” However, Division policy recognizes that there are times when remedies are not appropriate or feasible. One of those times is when an effective divestiture would essentially mean divesting one of the firms

¹⁸ 2004 Merger Remedies Guide at 5.

¹⁹ 2004 Merger Remedies Guide at 5.

²⁰ “Sen. Lee Comments on DOJ’s T-Mobile/Sprint Decision,” July 26, 2019, available at <https://www.lee.senate.gov/public/index.cfm/press-releases?ID=E4D78A0C-2096-4830-889F-825516016647>.

²¹ *Id.*

²² See Ex Parte Letter from Nancy J. Victory, counsel for T-Mobile, to Marlene H. Dortch, Secretary, Federal Communications Commission (March 11, 2019), at 1 n.3, available at <https://ecfsapi.fcc.gov/file/1031124977749/March%2011%202019%20Pricing%20ex%20parte.pdf>.

²³ See Letter from Regina M. Keeney, Nancy J. Victory and additional signatories to Marlene H. Dortch, Secretary, Federal Communications Commission (March 14, 2019) at 1-2, available at [https://ecfsapi.fcc.gov/file/10314256344084/March%2014%202019%20Public%20Ex%20Parte%20\(Response%20to%20Brattle\).pdf](https://ecfsapi.fcc.gov/file/10314256344084/March%2014%202019%20Public%20Ex%20Parte%20(Response%20to%20Brattle).pdf).

involved in the merger in order to restore competition. When “the entity that needs to be divested may actually be the firm itself,” then “blocking the entire transaction rather than accepting a divestiture may be the only effective solution.”²⁴

In sum, the Division has not articulated any reasons, let alone principled reasons, why it has turned its back on its own merger remedy policies in this case, many of which are long-standing and represent sound antitrust enforcement.

2. The divestiture of less than a full business unit carries significant execution risk and the risk is particularly high in this case.

The divestiture of less than a full business unit creates a serious risk that the divestiture will fail to restore competition. This is why, as a matter of policy, the Division “favors the divestiture of an existing business entity that has already demonstrated its ability to compete in the relevant market.”²⁵ As Deputy Assistant General Barry Nigro has stated, “asset carve outs are fraught with execution risk.”²⁶

The divestitures in the PFJ are far less than a full business unit. The divested assets in this case include prepaid brands with high churn rates, options on “decommissioned” cell sites and “decommissioned” retail stores (that may additionally require third-party consents), and an option to acquire Sprint 800 MHz licenses representing a small frequency band. If asset carve outs in general are “fraught with execution risk,” the execution risk is even greater in this case.

The divestiture buyer will have no reliable track record for current and prospective customers to evaluate whether the business will continue to be a reliable provider of the relevant products.²⁷ Here, for example, the Boost and Virgin brands will be divested, but not the network on which the phones run, the vast majority of retail stores, or the call centers. This creates a potential one-two punch for customers who experience issues with their phones or network service and leads to the likelihood that customer churn will be even higher than it is now. Sprint’s prepaid customer churn is already very high – more than 4% monthly, according to its SEC filings.²⁸ If Boost, Virgin and Sprint prepaid customers were to switch to other carriers, even at the current rate of churn, the divestiture buyer could easily lose *most* of its installed base of customers within two years – well before it could be expected to construct its own network even under the most optimistic of projections. This would wipe out the asserted benefits to the buyer of “acquiring an installed base of existing customers.”²⁹

²⁴ 2004 Merger Remedies Guide at 14-15.

²⁵ 2004 Merger Remedies Guide at 12.

²⁶ Deputy Assistant Attorney General Barry Nigro Delivers Remarks at the Annual Antitrust Law Leaders Forum in Miami, Florida (February 2, 2018), available at <https://www.justice.gov/opa/speech/deputy-assistant-attorney-general-barry-nigro-delivers-remarks-annual-antitrust-law>.

²⁷ 2004 Merger Remedies Guide at 12-13.

²⁸ Sprint Communications, SEC Form 10Q, August 6, 2019, p. 47.

²⁹ Competitive Impact Statement at 9.

Second, Division policy highlights that the divestiture of less than a full business entity carries the risk that the seller will sell fewer assets than are required for the purchaser to compete effectively going forward while the buyer may be willing to purchase these assets, even if they are insufficient to restore competition, at a low enough price.³⁰ As the Division has aptly observed:

A purchaser's interests are not necessarily identical to those of the public, and so long as the divested assets produce something of value to the purchaser (possibly providing it with the ability to earn profits in some other market or enabling it to produce weak competition in the relevant market), it may be willing to buy them at a fire-sale price regardless of whether they cure the competitive concerns.³¹

In this case, both of these concerns are front and center. The assets being sold are on their face insufficient to cure the competitive concerns, as they represent a tiny fraction of Sprint's existing business. And, although the terms of the commercial agreements are confidential, one may assume in the absence of evidence to the contrary that the buyer has negotiated favorable terms in exchange for withdrawing its opposition to the transaction.

Under these circumstances, neither the seller's nor the buyer's interest can be expected to match the interest of the public.

3. At its core, the remedy depends on behavioral conditions that will last for years, creating excessive entanglements between buyer and seller and requiring multiyear oversight.

Although the Division has characterized the remedy in this case as "structural," we respectfully submit that this is not an accurate characterization. Under Division policy, the term "structural" is generally reserved for divestiture remedies that do not involve ongoing entanglements between the divestiture buyer and seller, do not involve ongoing regulation of the buyer or seller's conduct, and do not require lengthy and extensive government monitoring and enforcement. The remedy in this case is more accurately characterized as a "conduct" remedy that includes certain limited divestitures. As such, it is contrary to long-standing DOJ policy which strongly favors structural remedies over behavioral decrees, particularly in horizontal mergers.³²

The weaknesses inherent in behavioral decrees are spelled out in the 2004 Merger Remedies Guide:

³⁰ 2004 Merger Remedies Guide at 13.

³¹ *Id.*

³² See 2004 Merger Remedies Guide at 9 ("structural merger remedies are strongly preferred to conduct remedies"). Indeed, the current Division leadership has reinforced the strong preference for structural relief by withdrawing the 2011 Merger Remedy Guides which lacked this explicit statement of Division preference. See Assistant Attorney General Makan Delrahim, "Remarks as Prepared for the 2018 Global Antitrust Enforcement Symposium" (September 25, 2018) at 11-12 (withdrawing 2011 Merger Remedies Guide and stating that 2004 Merger Remedies Guide will be in effect until Division releases an updated policy).

Structural remedies are preferred to conduct remedies in merger cases because they are relatively clean and certain, and generally avoid costly government entanglement in the market. . . . A conduct remedy, on the other hand, typically is more difficult to craft, more cumbersome and costly to administer, and easier than a structural remedy to circumvent.³³

Division leadership has elaborated on the problems with behavioral remedies in recent speeches. In a 2017 speech, Assistant Attorney General Delrahim explained that behavioral remedies are inherently regulatory, and therefore at odds with both free market principles and the dynamic realities of markets:

Like any regulatory scheme, behavioral remedies require centralized decisions instead of a free market process. They also set static rules devoid of the dynamic realities of the market. With limited information, how can antitrust lawyers hope to write rules that distort competitive incentives just enough to undo the damage done by a merger, for years to come? I don't think I'm smart enough to do that.

Behavioral remedies often require companies to make daily decisions contrary to their profit-maximizing incentives, and they demand ongoing monitoring and enforcement to do that effectively. It is the wolf of regulation dressed in the sheep's clothing of a behavioral decree. And like most regulation, it can be overly intrusive and unduly burdensome for both businesses and government.³⁴

Deputy Assistant Attorney General Barry Nigro expanded on these principles in a speech in 2018. He stressed that there is a growing consensus among antitrust economists and attorneys that *behavioral remedies "may simply be ineffective at remedying harm to competition."* Plus, he emphasized the costs of monitoring and enforcing such remedies, and in particular the fact that the Division too often finds itself in the business of investigating possible violations. This is not surprising, as behavioral decrees compel companies not to do things they ordinarily would do, and compel them to do other things they ordinarily would not do in an unregulated environment:

The imposition of a behavioral remedy inverts the Division's role into something it is not—the hall monitor for private businesses operating in a free market economy. Even worse, a behavioral approach raises serious risks of false negatives and false positives. Antitrust economists and attorneys across the ideological spectrum have recognized that behavioral decrees may simply be ineffective at remedying harm to competition. As FTC Commissioner Terrell McSweeney explained last year, behavioral relief 'at best only delays the merged firm's exercise of market power.' In addition, trying to regulate corporate behavior creates

³³ 2004 Merger Remedies Guide at 7-8.

³⁴ U.S. Dep't of Justice, Assistant Attorney General Makan Delrahim Delivers Keynote Address at American Bar Association's Antitrust Fall Forum (November, 16, 2017), <https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-keynote-address-american-bar>.

challenges monitoring and enforcing compliance. It should be no surprise that we find ourselves too often in the business of expending scarce taxpayer resources investigating possible violations of regulatory decrees, all aimed at ensuring that consumers do not suffer the harm the decree attempted to regulate away.³⁵

The bulk of the remedial provisions in the PFJ consist of behavioral conditions. Some of these require the merged company to work against its profit-maximizing incentives, such as by providing numerous services to a would-be competitor for an extended period of time. Others purport to order the buyer to do things it would not ordinarily do, such as to offer a particular type of service. The net result is excessive entanglements between buyer and seller and the requirement of multiyear oversight.

Indeed, the Division has experience in the telecom space with a failed remedy involving excessive entanglements. In 1998, MCI/WorldCom agreed to divest MCI's Internet assets to Cable & Wireless as a merger remedy.³⁶ At the time, Sprint and other third parties expressed concern that Cable & Wireless' post-divestiture dependence on MCI WorldCom for transport, operations support, and other services would leave Cable & Wireless vulnerable and a weak competitor.³⁷

Within two years, Cable & Wireless' Internet market share dropped from MCI's pre-divestiture 40 percent to less than 10 percent.³⁸ As it turned out, MCI failed to transfer all necessary personnel, contracts, contract documentation, database access, and billing services, despite obligations to do so.³⁹ The result was not replacement of lost competition but was, instead, litigation. Cable & Wireless eventually lodged a formal complaint with the European Commission and filed suit against MCI WorldCom in U.S. District Court, reaching an out of court \$200 million settlement.⁴⁰

The failed MCI divestiture to Cable & Wireless should stand as a stark warning to the Division about excessive entanglements and information asymmetries in a telecom remedy.

³⁵ U.S. Dep't of Justice, Deputy Assistant Attorney General Barry Nigro Delivers Remarks at the Annual Antitrust Law Leaders Forum in Miami, Florida (February 2, 2018), <https://www.justice.gov/opa/speech/deputy-assistant-attorney-general-barry-nigro-delivers-remarks-annual-antitrust-law>.

³⁶ See *In the Matter of Application of Worldcom, Inc. & MCI Communications Corp. for Transfer of Control of MCI Communications Corp. to Worldcom, Inc.*, 13 F.C.C. Rcd. 18025 ¶151 (F.C.C. 1998).

³⁷ *Id.* at 154 and fn. 426 (citing, among other comments, Sprint June 11, 1998 Comments at 11, 16).

³⁸ CWA Comments, MCI/World Com Applications for Transfer of Control, CC Docket No. 99-333 at 37. Data from Applicants' Internet Submission Attachments 3 and 5 for C&W's 2000 market share and *Boardwatch* June 1997 for MCI's pre-divestiture market share.

³⁹ See Cable & Wireless FCC Comments, CC Docket No. 99-333, Feb. 18, 2000 at 36-41.

⁴⁰ Rebecca Blumenstein, *MCI WorldCom to Pay Cable & Wireless \$200 Million to Settle Internet Dispute*, Wall Street Journal, March 2, 2000, available at <https://www.wsj.com/articles/SB951922751787792103>.

4. DISH fails to meet the Division’s standard requirements for a divestiture buyer.

Given that the Complaint alleges that the loss of a fourth competitor in the retail wireless market is competitively harmful, the minimum requirement that any remedy must meet to protect the public interest is that it must recreate a competitively significant fourth competitor. If it fails to do so, the result has been predicted in the complaint. This makes the competitive attributes of DISH not only relevant to the Tunney Act, but critical to the public interest determination. If DISH is not a suitable or effective competitor, the remedy is likely to fail and the competitive harm alleged in the Complaint will not be remedied.

The Division requires divestiture buyers to demonstrate “managerial, operational, technical, and financial capability” to “compete effectively” in the relevant market alleged in the complaint.⁴¹ The buyer in this case fails on every score – it lacks financial resources of its own and has not secured third-party funding; it has management that has not built a wireless network despite the legal obligation to do so; and it has no experience or technical ability to operate such a network, the challenges of which are extensive. At the same time, the buyer has demonstrated a willingness to abuse a federal program to obtain over \$3 billion in taxpayer-funded discounts, and thereby to make “a mockery of the small business program” in the words of then-Commissioner Ajit Pai.⁴²

a. Financial

Financially, DISH is not in good shape. It has been steadily losing customers.⁴³ It is highly and increasingly leveraged, with significant debt maturing soon.⁴⁴ Analysts predict that

⁴¹ 2004 Merger Remedies Guide at 32.

⁴² Statement of Ajit Pai, Commissioner, Federal Communications Commission, Hearing before the Senate Appropriations Subcommittee on Financial Services and General Government (May 12, 2015) at 5, <https://www.appropriations.senate.gov/imo/media/doc/hearings/051215%20Commissioner%20Pai%20Testimony%20-%20FSGG.pdf>.

⁴³ See Tuna N. Amobi, CFRA Research Note, July 30, 2019 (“We project a decline of 7.8% in 2019 revenues, to \$12.56 billion. In recent years, DISH has persistently shed a relatively sizable portion of its traditional pay-TV subscriber base (down 7% in H1 2019 on top of a 10% decline in 2018 on some notable carriage disputes and a 9% decline in 2017 in the aftermath of hurricane disruptions). With likely continued pricing pressures on a blended pay-TV average revenue per user (ARPU), we see another 4.5% decline in 2020 revenues. . . .”) (Accessed via Standard & Poor’s Capital IQ research database, hereinafter “CIQ.”)

⁴⁴ See “Ratings Action: Moody’s places DISH Network’s and DISH DBS’s ratings on review for downgrade,” July 29, 2019, https://www.moody.com/research/Moodys-places-DISH-Networks-and-DISH-DBSs-ratings-on-review--PR_405815 (detailing the company’s debt maturity obligations, the ratings agency noted “DISH DBS’s leverage is high at about 4.2x (with Moody’s standard adjustments) as of March 31, 2019, and it has steadily mounting maturities with \$4.4 billion due through June 2021. We believe that the company can meet the DISH DBS September 2019 \$1.3 billion maturity and the \$1.4 billion purchase price for the prepaid wireless subscriber businesses being acquired with cash and securities on hand (\$2.4 billion as of March 31, 2019) and free cash flow generated through the close of the acquisition. However, DISH DBS has another maturity totaling \$1.1 billion in May 2020 and another totaling \$2.0 billion in June 2021 which appear to be beyond current cash flow capacity. Therefore, it is highly likely in our view, that the company will raise new debt at DISH Network over the coming year. . . . If any or all of the capital needs are financed with new debt, a significant strain on DISH’s consolidated balance sheet will likely occur.”).

DISH will have difficulty meeting its debt obligations related to DBS in 2022 and that business may be forced into a restructuring.⁴⁵ Moody's states that DISH's June 2021 \$2.0 billion maturity is "beyond cash flow capacity" and the company likely will need to take on new debt.⁴⁶

According to its CEO, DISH presently has no financing in place to build a 5G retail network.⁴⁷ This should be a big red flag for the Division. At least one analyst has commented that DISH's estimate of the cost of building a network is so low as to be "just silly."⁴⁸ In short, while Sprint may have financial challenges, it is at least actively building a 5G network. DISH, on the other hand, faces similar if not greater financial challenges in its present business without factoring in the billions of dollars it would cost to construct a 5G retail network. Under the Division's standard policy, DISH has failed to show that it has the financial capability required of an acceptable buyer.

b. Managerial

Over the last year DISH has lost a significant number of senior executives.⁴⁹ Its management has no experience building a retail 5G network. There has been no showing that it has the management in place to oversee the construction of a 5G retail network. Moreover, DISH's CEO has earned a reputation as an unreliable partner with an appetite for litigation.⁵⁰ This hardly makes DISH management a "maverick" in the sense contemplated by the Horizontal Merger Guidelines.

⁴⁵ Jeffrey Wlodarczak, Pivotal Research Group, "Story Morphs from Spectrum Sale to Building Wireless Business," July 30, 2019 ("Using our current forecasts, we believe that the core DBS business will have difficulty repaying its \$2B '22 maturity, and beyond. . . . potential DBS could be forced into '22 restructuring")(Accessed via CIQ).

⁴⁶ See <https://www.moody.com/research/Moodys-places-DISH-Networks-and-DISH-DBSs-ratings-on-review-PR-405815>.

⁴⁷ See Drew FitzGerald, Dish's Ergen Defends Company's Wireless Plans, Wall Street Journal (August 6, 2019) ("We know that we do need to strengthen our balance sheet, but we don't need it tomorrow We don't need \$10 billion tomorrow. In fact, we don't need any money tomorrow,"), <https://www.wsj.com/articles/dishs-ergen-defends-companys-wireless-plans-11565119655>; Jeffrey Hill, The Dish on Ergen's 5G Masterstroke, Via Satellite (October 2019) ("We still plan to spend about \$10 billion to build our network and we're still going to need help."), <http://interactive.satellitetoday.com/via/october-2019/the-dish-on-ergens-5g-masterstroke/>.

⁴⁸ See Daniel Frankel, Can Dish Really Build a 5G Network for \$10B?, Multichannel News (August 5, 2019) ("Verizon spends \$15 billion annually to maintain a network that they've already built," MoffettNathanson principal and senior analyst Craig Moffett wrote in a research note. "The idea that Dish might spend \$10 billion (their own estimate on previous conference calls) and then somehow be finished is, well, just silly."), <https://www.multichannel.com/news/can-dish-really-build-a-5g-network-for-10b>.

⁴⁹ Jeffrey Wlodarczak, Pivotal Research Group, "Story Morphs from Spectrum Sale to Building Wireless Business," July 30, 2019 ("Over the last year DISH has lost a significant number of senior executives.")

⁵⁰ See, e.g., Mike Dano, "What Does Dish's Charlie Ergen Want?" <https://www.lightreading.com/mobile/5g/what-does-dishs-charlie-ergen-want-/d/d-id/752684>; Dish Network's Charlie Ergen Is the Most Hated Man in Hollywood, <https://www.hollywoodreporter.com/news/dish-networks-charlie-ergen-is-432288>.

c. Technical and Operational

DISH faces enormous operational and technical obstacles in emerging as an independent competitor with its own 5G network and has not demonstrated that it has the necessary expertise to do so.

As Dr. Afflerbach notes in the attached Declaration, because T-Mobile will control the technical aspects of the network, T-Mobile will be able to limit the MVNO's potential service strategies—for example, by determining where networks will and will not be upgraded, and when and whether new services will be available. Dr. Afflerbach also observes that the proposed relationship between T-Mobile and DISH turns the typical MNO incentive on its head: “MNOs typically only seek ways to monetize their excess capacity where it exists—not to nurture the MVNOs.” In addition, since the MVNO is essentially reselling the MNO's service, deficiencies in the service provided by the merged company become unsolvable deficiencies in the MVNO's service. Enforcement will be difficult, and remedies may not be commensurate with the harm inflicted on DISH. Simply by underperforming or delaying response to resolving technical problems, the merged company can badly harm the buyer.

As Dr. Afflerbach also notes, DISH's execution risks in constructing a network are substantial and real. Under the most optimistic timeline, DISH will require at least a year to build a robust internal team, seek and select contractors, and prepare detailed designs and engineering. DISH will need more than four years to deploy tens of thousands of sites with robust fiber backhaul to develop a reliable footprint that is not highly dependent on T-Mobile. That process will require extensive design, planning, procurement, site acquisition, and approvals—as well as an enormous capital investment.

On July 30 and July 31, 2019, DISH staff met with FCC Commissioners and staff to discuss the company's technical and business plans and to share an executive summary of the “RFI/P” DISH had earlier distributed to potential industry suppliers. Based on the executive summary of the RFI/P provided in the Ex Parte filing, we see that DISH is still in a fact-finding stage—identifying which suppliers may be candidates for different parts of the build process, and asking wide-ranging questions about their potential roles. This type of document usually precedes engineering and design decisions, the development of more focused procurement documents, and the selection of contractors to supply materials and build a network.

In addition, the 3GPP Rev 16 equipment that DISH Chairman Charlie Ergen has said would be central to building a highly virtualized network with low operation costs relies on standards that will not be available until 2020, with actual equipment possibly not available until late 2020 or 2021. Without that equipment, DISH would need to change its approach to a less virtualized network and, potentially, a different business model.

DISH's risk factors thus include activating infrastructure at tens of thousands of sites while relying on technologies that do not yet exist, creating and managing a large new team in a tight labor environment, getting permitting approvals, coordinating with T-Mobile (itself in the

process of an ambitious buildout—which could limit T-Mobile’s resources available for coordinating with DISH), handling procurement, and financing a project likely to cost more than \$10 billion.

In this light, it is also worth considering other major communications infrastructure initiatives (e.g., Google Fiber) that failed to execute according to plan.

d. History of Regulatory Evasion

In addition to failing the Division’s standard evaluation of a potential buyer, DISH has two attributes which make it uniquely unsuited as a divestiture buyer. First, it has a well-documented history of warehousing spectrum and avoiding its obligations to the FCC. Second, it has abused the FCC’s small business program.

i. Warehousing spectrum

T-Mobile itself highlighted DISH’s long history of speculative warehousing of spectrum and failure to meet FCC-imposed deadlines. As T-Mobile commented in a March 2019 letter to the FCC, “*DISH stands out for its efforts to game the regulatory system*” and “*has little interest in actually delivering real 5G service.*”⁵¹ As we detail below, in three separate instances dating back to 2009, DISH acquired spectrum licenses and each time missed the FCC mandated construction deadlines. In fact, DISH has failed to put any of its extensive spectrum holdings to use. Now, DISH seeks approval from the FCC for further extension of its construction deadlines to 2025 – a full 16 years after its initial spectrum acquisition. Based on this track record, the Division should view with enormous skepticism the DISH commitments to build a facilities-based wireless network.

700 MHz E Block. In 2008, DISH won in the Lower 700 MHz E Block 168 licenses in auction 73. The licenses were granted in February 2009. The FCC rules for this spectrum block require licensees to construct a wireless network reaching 35 percent of the geographic area of each licensed Basic Economic Area (BEA) by June 2013 and 70 percent of the geographic area of each BEA by 2019.⁵² One day before the 2013 deadline, DISH asked the FCC for an extension and easing of build out requirements. The FCC complied, extending the first construction deadline to March 2017, and the second to March 2021, and easing the construction requirements to 40 percent and 70 percent of the population of each BEA. DISH missed the March 2017 deadline, triggering a requirement that DISH build to 70 percent of the population in each BEA by March 7, 2020.⁵³ With this deadline looming, DISH asked the FCC on July 26, 2019 to delay the construction deadline once again, with a requirement to build to 50 percent

⁵¹ See Ex Parte Letter from Nancy J. Victory, counsel for T-Mobile, to Marlene H. Dortch, Secretary, Federal Communications Commission (March 11, 2019), at 1 n.3, available at <https://ecfsapi.fcc.gov/file/1031124977749/March%2011%202019%20Pricing%20ex%20parte.pdf>.

⁵² See 28 FCC Rcd 15122 ¶ 55, See also 47 CFR 27.14G

⁵³ *Id.*

of the U.S. population by 2023, and to 70 percent of the population in each BEA by 2025.⁵⁴ The 2025 deadline is a full 16 years after DISH acquired the spectrum licenses. To date, the FCC has not approved the construction extension request.⁵⁵

AWS-4 Spectrum. In March 2012, DISH acquired the spectrum licenses in the bankruptcy of two satellite companies. In December 2012, the FCC approved DISH's request to use the spectrum for terrestrial wireless, creating the AWS-4 service. In the *AWS-4 Order*, the FCC required DISH to build out to 40 percent of the population in each BEA by March 2017 and to 70 percent of the population in each BEA by March 2020.⁵⁶ Missing the March 2017 deadline would push the 2020 deadline back to March 2019. DISH subsequently asked for, and the FCC granted, an extension of the 2020 deadline to March 2021, with a push back to March 2020 if the March 2017 deadline was missed.⁵⁷ DISH failed to meet the 2017 deadline, and therefore faces a looming March 2020 construction deadline for this spectrum.⁵⁸ DISH has asked the FCC to delay the construction deadline once again, with the same requirements noted above for the 700 MHz E block (e.g. 50 percent of US population by 2023, and 70 percent of the population in each BEA by 2025).⁵⁹ To date, the FCC has not approved the construction extension request.⁶⁰ The 2025 deadline is a full 13 years after DISH received FCC authority to use the AWS-4 spectrum for terrestrial wireless.

H Block. In 2014, DISH won all the licenses in the H block auction, with construction requirements to serve 40 percent of the population in each license area by April 2018 and 75 percent of the population in each license area by April 2024. Not meeting the first benchmark reduces the license term to April 2022.⁶¹ DISH did not meet the 2018 deadline.⁶² It has asked the FCC to delay the final construction deadline to 2023 and 2025, as noted above, which is 11

⁵⁴ See Application for Extension of Time of American H Block Wireless L.L.C., ULS File No. 0008741236 (filed July 26, 2019); Application for Extension of Time of Gamma Acquisition L.L.C., ULS File No. 0008741603 (filed July 26, 2019); Application for Extension of Time of Manifest Wireless L.L.C., ULS File No. 0008741789 (filed July 26, 2019). See also Letter from Jeffrey H. Blum, DISH Senior Vice-President, Public Policy & Government Affairs to Donald Stockdale, Chief, Wireless Telecommunications Bureau, *re: DBSD Corporation, AWS-4, Lead Call Sign T070272001; Gamma Acquisition L.L.C., AWS-4, Lead Call Sign T060430001; Manifest Wireless L.L.C., Lower 700 MHz E Block, Lead Call Sign WQJY944; American H Block Wireless L.L.C., H Block, Lead Call Sign WQTX200; ParkerB.com Wireless L.L.C., 600 MHz, Lead Call Sign WQZM232* (filed July 26, 2019) ("DISH July 26, 2019 Letter").

⁵⁵ See Public Notice, *Wireless Telecommunications Bureau Consolidates Proceedings on DISH Applications for Extension of Time to Construct Facilities with Docket of T-Mobile/Sprint Transaction*, WT Docket No. 18-197, ULS File Nos. 0008741236, 0008741420, 0008741603, and 0008741789, DA 19-747, August 7, 2019.

⁵⁶ 28 FCC Rcd 16787 ¶¶ 187-188. See also 27 FCC Rcd 16102.

⁵⁷ 28 FCCR 16787 ¶¶ 8, 41-42.

⁵⁸ 28 FCCR 16787 ¶¶ 43; 47 CFR 27.14Q; see also License T072001.

⁵⁹ DISH July 26, 2019 Letter.

⁶⁰ See Public Notice, *Wireless Telecommunications Bureau Consolidates Proceedings on DISH Applications for Extension of Time to Construct Facilities with Docket of T-Mobile/Sprint Transaction*, WT Docket No. 18-197, ULS File Nos. 0008741236, 0008741420, 0008741603, and 0008741789, DA 19-747, August 7, 2019.

⁶¹ 28FCCR9483, ¶195, 47 CFR 27.14R.

⁶² *Id.* License # WQTX200.

years after it acquired the H Block spectrum.⁶³ To date, the FCC has not approved the construction extension request.⁶⁴

ii. Misuse of government auction

DISH has also misused a government program designed to incentivize wireless competition via new entrants and independent small businesses.

Northstar and SNR Wireless participated in the FCC's 2015 Spectrum Auction 97.⁶⁵ Northstar and SNR claimed gross revenues of less than \$15 million over three years in order to qualify as a "very small business" under the FCC rules. The "very small business" status qualified them to receive bidding credits equal to \$3.3 billion or 25 percent off the amount of their gross winning bids.⁶⁶ The FCC ruled that Northstar and SNR were not eligible for the credit as they did not include the average gross revenues of DISH which held an 85 percent equity interest in both companies.⁶⁷

The United States Court of Appeals for the District of Columbia Circuit ruled that the FCC "reasonably interpreted and applied" its precedent "when it determined that DISH had de facto control over SNR and Northstar."⁶⁸ The D.C. Circuit remanded the case back to the FCC so that the Commission could provide the companies with an opportunity to modify and renegotiate their agreements with DISH.⁶⁹ In a hearing before the Senate Appropriations Subcommittee on Financial Services and General Government, then-FCC Commissioner Ajit Pai stated that DISH had made "a mockery of the small business program."⁷⁰

⁶³ DISH July 26, 2019 Letter.

⁶⁴ See Public Notice, *Wireless Telecommunications Bureau Consolidates Proceedings on DISH Applications for Extension of Time to Construct Facilities with Docket of T-Mobile/Sprint Transaction*, WT Docket No. 18-197, ULS File Nos. 0008741236, 0008741420, 0008741603, and 0008741789, DA 19-747, August 7, 2019.

⁶⁵ Memorandum and Opinion Order, In the Matter of Northstar Wireless, LLC (File No. 0006670613) and SNR Wireless LicenseCo, LLC (File No. 0006670667) Applications for New Licenses in the 1695-1710 MHz, and 1755-1780 MHz and 2155-2180 MHz Bands, FCC 15-104, at 2 (Released August 18, 2015), available at <https://docs.fcc.gov/public/attachments/FCC-15-104A1.pdf>.

⁶⁶ *Id.* at 2-3.

⁶⁷ *Id.* at 3.

⁶⁸ *SNR Wireless LicenseCo, LLC, et al. v. F.C.C.*, 868 F.3d 1021, 1030 (D.C. Cir. 2017).

⁶⁹ *Id.* at 1046.

⁷⁰ Statement of Ajit Pai, Commissioner, Federal Communications Commission, Hearing Before the Senate Appropriations Subcommittee On Financial Services And General Government, May 12, 2015 ("Allowing DISH, which has annual revenues of approximately \$14 billion and a market capitalization of over \$31 billion, to obtain over \$3 billion in taxpayer-funded discounts makes a mockery of the small business program. Indeed, DISH has now disclosed that it made approximately \$8.504 billion in loans and \$1.274 billion in equity contributions to those two companies—hardly a sign that they were small businesses that lacked access to deep pockets. I am appalled that a corporate giant has attempted to use small business discounts to box out the very companies that Congress intended the program to benefit and to rip off American taxpayers to the tune of \$3.3 billion. This is money that otherwise would have been deposited into the U.S. Treasury. This is money that could be used to fund 581,475 Pell Grants, pay for the school lunches of 6,317,512 children for an entire school year, or extend tax credits for the hiring of 138,827 veterans for the next 10 years. As appropriators, you know that this is real money.").

In summary, DISH fails the Division’s standard “fitness” test of a prospective acquirer of divested assets.

5. The incentives for DISH to build in a timely framework its own retail wireless network in competition with AT&T, Verizon and T-Mobile are weak. By comparison, DISH has strong incentives to remain an MVNO under favorable terms and ultimately sell its spectrum, or, alternatively, to operate any network it builds outside of the relevant market.

Even assuming for the sake of argument that a weak and otherwise unacceptable buyer could somehow transform into a strong competitor at some future date, the remedy provides insufficient incentives for this transformation to take place.

Division policy is clearly articulated in the Policy Guide to Merger Remedies: “The goal of a divestiture is to ensure that the purchaser possesses both the means and the incentive to maintain the level of premerger competition in the market(s) of concern.”⁷¹ This point is repeated and emphasized later on:

The package of assets to be divested must not only allow a purchaser quickly to replace the competition lost due to the merger, but also provide it with the *incentive* to do so. Unless the divested assets are sufficient for the purchaser to become an effective and efficient competitor, the purchaser may have a greater incentive to deploy them outside the relevant market.⁷²

From an engineering standpoint, DISH has powerful incentives to create something less than a fully competitive 5G network. As discussed earlier in these comments and in Dr. Afflerbach’s accompanying Declaration, the technical difficulties of creating a nationwide 5G network are enormous and likely to be underappreciated. At the same time, the commitments DISH has made are far more limited than they appear at first blush. DISH is required to serve only 70 percent of the population by 2023 – and only at 35 Mbps. This speed is already exceeded in many 4G-served areas (including by Sprint) and represents a very low goal for 5G service. If 35 Mbps is the typical speed of the DISH network in 2023, while the other three facilities-based wireless carriers offer service in hundreds of Mbps – and if this limitation is a baked-in technological limit because of fewer sites or less capacity per site – the result will not be a bona fide fourth network, but a niche network closer to the limited internet of things (IoT) network proposed by DISH prior to the T-Mobile deal.

From a financial standpoint, DISH’s incentives run counter to the Division’s goal of creating a competitively significant new entrant. Several prominent analysts who have examined DISH’s incentives have pointed to: (a) the enormous financial challenges of building a competitive 5G retail network; (b) the fact that DISH may be better served financially by remaining an MVNO customer of T-Mobile rather than building a competitive network; and (c)

⁷¹ 2004 Merger Remedies Guide at 9.

⁷² 2004 Merger Remedies Guide at 10-11 (emphasis in original).

the incentives DISH has to provide services outside of the relevant market (e.g. wholesale services) even if it does build a network.

For example, a research analyst at Guggenheim Securities wrote: “We continue to see many possible outcomes for DISH that are unlikely to result in a multi-billion dollar network build to end up a sub-scale distant fourth provider with a handful of prepaid subscribers.”⁷³ A CFRA analyst noted: “[W]e remain skeptical on the potential financial, technical and regulatory hurdles” DISH faces in entering the market.⁷⁴ And Deutsche Bank Research analysts wrote: “We don’t believe that DISH’s strategy has been focused in any meaningful way on consumer wireless, at least not for the past few years. Instead, the company has focused on a Neutral Host wholesale model, which would allow clients to own and manage their own slice of the network through virtualization and to fully control and provision their company’s own applications and services.”⁷⁵

Although the terms of the commercial agreements between DISH as buyer and T-Mobile as seller are confidential, we can assume in the absence of evidence to the contrary that the terms are highly favorable to DISH. This creates exactly the wrong incentives in the buyer. As one economist has observed:

. . . Dish had blocking power to stop the settlement from happening. So it likely extracted the best resale arrangement in the history of resale. And if that’s true, then why would Dish invest and become a facilities-based provider if the margins from resale are large and guaranteed for seven years?⁷⁶

The PFJ includes the possibility of financial penalties in an effort to incentivize the buyer to honor its commitments. However, DISH’s financial incentives to walk away from its commitments for the right price swamp the penalties in the PFJ. As one analyst has written:

We also cannot discount that Dish pulls out at the last moment and sells its spectrum. Its spectrum is worth much more—with some estimates around \$30 billion—than the \$3.6 billion that it paid for the Sprint prepaid business and the fine to the government.⁷⁷

The failure of the buyer to satisfy basic Division requirements for a buyer, and the lack of adequate incentives for the buyer to compete in the relevant market, violate long-standing Division policy.

⁷³ Mike McCormack, Guggenheim Securities, DISH - Unlikely the Last Chapter (July 29, 2019) (Accessed via CIQ).

⁷⁴ Tuna N. Amobi, CFRA, CFRA Keeps Sell Opinion on Shares of Dish Network Corp. (July 30, 2019) (Accessed via CIQ).

⁷⁵ Bryan Kraft, Deutsche Bank Research, The Next Chapter (July 30, 2019) (Accessed via CIQ).

⁷⁶ The Capitol Forum, Transcript of T-Mobile/Sprint Conference Call with Hal Singer (August 5, 2019) at 1, available at <https://thecapitolforum.com/wp-content/uploads/2019/08/T-Mobile-Sprint-2019.08.05.pdf>.

⁷⁷ Roger Entner, Industry Voices—Entner: The skinny on the T-Mobile/Sprint/Dish deal, Fierce Wireless (August 2, 2019), <https://www.fiercewireless.com/wireless/industry-voices-entner-sorting-out-good-and-bad-t-mobile-sprint-dish-deal>.

6. Vague and ambiguous language in several of the PFJ’s central regulatory provisions give the parties an escape route and render the PFJ difficult to administer or enforce.

In multiple instances, the PFJ uses open-ended, vague and ambiguous language with reference to defendants’ obligations and/or the time within which certain actions must be taken. This is a recurring theme in the PFJ. Examples include “take all actions required,” “reasonably necessary,” “reasonably related,” “promptly,” “good faith,” “not unreasonably,” and “best efforts.”

If this vague language were limited to unimportant parts of the PFJ, it would be of less concern. However, vague and non-specific language is used in connection with central behavioral conditions in the PFJ, including migration of divested customers to a new network (“take all actions required”), the ability of the buyer to demand additional divestiture assets beyond those specified in the PFJ (“reasonably necessary . . . for continued competitiveness”), the terms of the transition services agreement that would enable the buyer to serve its newly acquired customers (“reasonably related to market conditions”), the decommissioning of unnecessary cell sites (“promptly”), negotiations between merging parties and the divestiture buyer to lease the buyer’s unused 600 MHz spectrum (“good faith”), nondiscrimination provisions involving conduct such as blocking, throttling, or otherwise deprioritizing service to the divestiture buyer and its customers (“shall not unreasonably discriminate”), and the merged company’s obligation to provide operational support to those customers (“best efforts”).

These open-ended, undefined terms provide a convenient escape route for a defendant wishing to avoid its obligations. Moreover, they make it virtually 100% certain that disputes will arise as to whether the defendants have fulfilled their commitments. What would constitute a failure to “take all actions required?” What additional assets would be “reasonably necessary for . . . continued competitiveness?” What does it mean to “not unreasonably discriminate?” The list could go on. The Monitoring Trustee, the Division, and ultimately the District Court are likely to see a parade of disputes over the next seven or more years.

In addition, Paragraph IV(E) starkly illustrates a problem with asset carve outs. The prior four subsections list the divestiture assets. But Paragraph IV(E) gives the divestiture buyer one year to determine if it needs additional assets beyond those included in the PFJ. The determination comes with a requirement that such additional assets are “reasonably necessary for the continued competitiveness of the Divestiture Assets.” What constitutes “reasonably necessary for . . . continued competitiveness?” Is this supposed to catch a situation where the buyer did not know what it actually needed until the divestitures have occurred? If so, it suggests a profound weakness in permitting partial asset carve outs in this case.

It does not require much imagination to envision a situation in which the buyer claims that additional assets are “reasonably necessary” but the seller disagrees. The Division would then be required to side with either the buyer or seller. Although the language appears to give the Division sole discretion to make a determination, the reality is that such a dispute could

easily arise and would not be put to rest merely because the Division makes a determination. (As an example, if the Division denies the buyer's request, the buyer can later blame the Division if and when the remedy fails.) This paragraph also suggests that neither the buyer nor the Division knows at this point what the buyer may need.

There are also likely to be disputes between the divestiture buyer and the Division that go to the heart of the remedy. Notably, Paragraph IV(F) requires the buyer to "offer retail mobile wireless services, including offering nationwide postpaid retail mobile wireless service within one (1) year of the closing of the sale of the Prepaid Assets." The inclusion of postpaid service shows, if nothing else, that the Division is aware that unless the buyer is able to attract and service postpaid customers, the remedy could not possibly restore the competition lost through the merger. But it takes little imagination to realize that "offering" a service could mean something much different and much less than marketing and promoting the service with millions of dollars of advertising, or hiring and training the personnel necessary fully to support the service.

Years ago, prior to their merger, the FCC ordered XM and Sirius to "design" an interoperable radio. The companies designed and built such a radio but never marketed or sold it. Yet they insisted that they had complied with the FCC's requirements.⁷⁸ The word "offer" has the same problems as the word "design." DISH can "offer" a service without publicizing it or supporting it or pricing it competitively. This is a fundamental problem in a regulatory decree that orders a party to do something that, as a purely business matter and in the absence of a regulatory obligation, it may well decline to do because there is no business case.⁷⁹

Finally, we note that open-ended and non-specific language might well be appropriate in a contract between private parties entering into a long-term business relationship where all of the contractual terms cannot be spelled out in advance. Open-ended and deliberately flexible terms permit the contracting parties to adapt and adjust their relationship as circumstances require. But in a court order that obligates a major market participant to create and facilitate the entry of a new competitor, this sort of language is deeply problematic. It is an invitation to a great deal of mischief, including evasion and repeated disputes. It is likely to draw the Monitoring Trustee, the Division, and the Court into disputes over the contours and timing of obligations, making the remedy extremely difficult if not impossible to administer. Given that this problem is not isolated but runs throughout the PFJ, the Division is unlikely to be able effectively to enforce compliance through contempt proceedings under Section XVIII, regardless of the burden of proof.

⁷⁸ See, e.g., Matthew Lasar, "Sirius, XM blast C3SR, defend lack of radio interoperability," *Ars Technica* (June 10, 2008), <https://arstechnica.com/uncategorized/2008/06/siriux-xm-blast-c3sr-defend-lack-of-radio-interoperability/>.

⁷⁹ In connection with the FCC remedy in the Comcast/NBCU transaction, Bloomberg and Comcast got into a lengthy dispute over the meaning of the word "neighborhood." See <https://www.multichannel.com/news/bloomberg-comcast-square-264872>.

7. Under any reasonable definition of the “public interest,” a remedy that carries a high risk of failure and exposes the public to substantial economic harm if it fails cannot be said to be in the “public interest.”

By far the most likely outcome in this case is that the complex, highly regulatory remedy will fail or fall short. In either event, as the Division has alleged in the Amended Complaint, consumers will end up paying the price.

The risk of failure has significant consequences for the public interest determination. Division officials have clearly stated as a matter of law and policy that the Clayton Act directs antitrust enforcers and courts to employ a low risk tolerance. Risky, partial and complex remedies, however well-intentioned, do not warrant shifting some of the risk posed by an anticompetitive merger back onto consumers. In 2016, then Assistant Attorney General Bill Baer was explicit on this point:

In enacting Section 7 over 100 years ago, Congress decided how antitrust risk should be allocated as between merging parties and the public. The Clayton Act directs antitrust enforcers and the courts to employ a low risk tolerance, and zealously protect the American economy and American consumers from mergers that may reduce competition and may lead to higher prices, reduced output, lower quality, or lessened innovation. . . . Merger law is intended to protect consumers from the potential for diminished competition. Here is where Congress’ risk-allocation determination matters a lot. Partial remedies do not cut it. They do not warrant shifting some portion of the risk posed by the merger back to consumers and competition.⁸⁰

The following year, Assistant Attorney General Makan Delrahim reiterated the same point in even stronger language:

Decrees should avoid taking pricing decisions away from the markets, and should be simple and administrable by the DOJ. We have a duty to American consumers to preserve economic liberty and protect the competitive process, and we will not accept remedies that risk failing to do so. I believe this is a bipartisan view. As my friend, former AAG for Antitrust Bill Baer said in Senate testimony last year, “consumers should not have to bear the risks that a complex settlement may not succeed.”⁸¹

The price of a failure of the remedy has been quantified in this case. Not only has DOJ alleged that the merger, unremedied, would lead to consumers paying billions of dollars more each year, but on April 8, 2019 DISH itself submitted an analysis of the price increases in

⁸⁰ U.S. Dep’t of Justice, Acting Associate Attorney General Bill Baer Delivers Remarks at American Antitrust Institute’s 17th Annual Conference (June 16, 2016), <https://www.justice.gov/opa/speech/acting-associate-attorney-general-bill-baer-delivers-remarks-american-antitrust-institute>.

⁸¹ U.S. Dep’t of Justice, Assistant Attorney General Makan Delrahim Delivers Keynote Address at American Bar Association’s Antitrust Fall Forum (November 16, 2017), <https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-keynote-address-american-bar>.

countries that have gone from 4 to 3 MNOs. As further evidence, we cite an econometric study from the UK's telecommunications regulator of 25 countries found that "removing a disruptive player from a four-player market could increase prices by between 17.2% and 20.5% on average." Another study cited by DISH found "a long run price-increasing effect of a four-to-three merger," of as high as 29% compared to countries with 4 MNOs.⁸²

Conclusion.

For the reasons expressed in these comments and in the accompanying Declaration of Dr. Afflerbach, the proposed remedy flies in the face of numerous Division remedy policies and the odds are remote that the remedy will work as intended. The Division, following its own long-standing policies, rejected similar remedies in Aetna/Humana and Haliburton/Baker Hughes and filed suit to block those transactions.

We respectfully submit that under any reasonable definition of the "public interest," a complex remedy that carries a high risk of failure and exposes the public to substantial economic harm if it fails is not in the "public interest." The Division should exercise its power under Paragraph IV(A) of the Stipulation and Order to withdraw its consent to the entry of the PFJ.

Sincerely,



Debbie Goldman
Telecommunications Policy and Research Director
Communications Workers of America

Allen P. Grunes
Counsel for Communications Workers of America

⁸² Letter from Pantelis Michalopoulos, Counsel to DISH Network Corporation, to Marlene Dortch, FCC, WT Docket No. 18-197 (April 8, 2019), <https://ecfsapi.fcc.gov/file/104080252316854/DISH%204-8-19%20Ex%20Parte%20WT%2018-197%20Europe%20Studies.pdf>.

**DECLARATION OF ANDREW AFFLERBACH,
PH.D., P.E.
Chief Executive Officer and Chief Technology Officer,
CTC Technology & Energy**

DECLARATION OF ANDREW AFFLERBACH, PH.D., P.E.

Relevant experience and qualifications of Andrew Afflerbach, Ph.D., P.E.

1. I have been the Chief Executive Officer and Chief Technology Officer of Columbia Telecommunications Corporation (d/b/a CTC Technology & Energy), a communications engineering consultancy, since 2000, and was Senior Scientist at CTC from 1996 until 2000. I specialize in the planning, design, and implementation of communications infrastructure and networks. My expertise includes fiber and wireless technologies and state-of-the-art networking applications. I have closely observed the development of wireless technology since the advent of the commercial internet in the 1990s. I submit this Declaration in connection with the Tunney Act Comments of the Communications Workers of America in *United States v. Deutsche Telekom AG, et al.*, No. 1:19-cv-02232-TJK.
2. As CTO, I am responsible for all engineering work and technical analysis performed by CTC. I have planned and overseen the implementation of a wide variety of wired and wireless government and public safety networks. I have advised cities, counties, and states about emerging technologies, including successive generations of wireless networks across a range of licensed and unlicensed spectrum bands. I have developed broadband technology strategy for cities including San Francisco, Seattle, Atlanta, Washington, D.C., and New York; for states including Connecticut, Delaware, Kansas,

Kentucky, and New Mexico; and for the government of New Zealand's national broadband project.

3. I have designed wireless networks for large cities, counties, and regions. I lead the CTC team advising the State of Texas Department of Transportation and many local governments on wireless facilities standards and processes. I also lead the CTC technical teams conducting FirstNet planning for the District of Columbia and the State of Delaware.
4. I have prepared extensive technical analyses for submission to the U.S. Federal Communications Commission and U.S. policymakers on broadband expansion to underserved schools, libraries, and other anchor facilities; on due diligence for the IP transition of the U.S. telecommunications infrastructure; on options for open access on wireless broadband networks; and on the relative strengths and weaknesses of various wired and wireless technologies.
5. Under my direction, the technical team at CTC has advised hundreds of public and non-profit clients, primarily in the United States. My technical staff has been engaged on projects encompassing the evaluation or planning of hundreds of miles of fiber optics and hundreds of wireless nodes in rural, suburban, and urban areas across the country. My experience with rural broadband engineering encompasses the full range of geographic typologies in the United States, from the desert and mountains of the West to the plains in the Midwest to the mountain and coastal areas of the East.
6. I am a licensed Professional Engineer in the Commonwealth of Virginia and the states of Delaware, Georgia, Maryland, and Illinois. I received a Ph.D. in Astronomy in 1996 from

the University of Wisconsin–Madison and an undergraduate degree in Physics from Swarthmore College in 1991. My full CV is included in Attachment A.

From a technical and business standpoint, Dish would be highly dependent on T-Mobile as an MVNO under the terms of the Proposed Final Judgment (PFJ)

7. According to the PFJ, Dish would become a mobile operator initially by purchasing Boost, Virgin Mobile, and Sprint’s prepaid services, which currently operate as Sprint brands. Dish would thus operate as a mobile virtual network operator (MVNO), reselling T-Mobile’s service while it builds its own mobile network operator (MNO) network—a complex and expensive process that would take many years.
8. The terms of the proposed T-Mobile/Dish MVNO agreement (called the Full MVNO Agreement in the PFJ) have not been provided to the public, and there is no requirement to make them public. (This is not unusual in the telecommunications industry; MVNO agreements frequently are confidential.) But given that an MVNO resells an MNO’s capacity under the MVNO’s brand name, all MVNOs share a total dependence on their MNO host networks.
9. For example, from a technical standpoint, the MNO issues the Subscriber Identity Module (SIM) cards that identify the MVNO users’ devices—so the MVNO users’ devices connect to the MNO’s network and cannot access another network unless the MNO allows roaming to that network.
10. In addition, the MNO manages how and whether the MVNO network connects to the MNO network; determines how much capacity (speed) is available to each MVNO user

device; determines whether there are limits to the total number of MVNO subscribers (either nationally or within individual areas of the network); determines the price it will charge the MVNO for access and bandwidth; determines whether a service area will have 2G, 3G, 4G or 5G service; chooses the duration of the MVNO agreement; and establishes such parameters as geographic limitations on the MVNO's subscribers, which spectrum blocks can be used, whether the MVNO's users have access to particular services (e.g., video, 5G), the degree to which the MVNO's users have priority (especially where there is heavy demand for the MNO's network), and what types of user equipment can be operated. MNOs provide no transparency to the MVNO—no view into the “back end” of the network; the MVNO simply pays the bill for its services without being able to know how they are delivered, or if there is any way to better optimize the services or the network for its needs.

11. This technical dependence illustrates the criticality of the MVNO agreement terms. Based on the PFJ and other public documents, we have no way of knowing the terms under which Dish's network performance would be determined.

12. Because of its control of the technical aspects of the network, the MNO could also effectively limit the MVNO's potential service strategies—for example, by determining where networks will and will not be upgraded to 5G, and when and whether new services will be available. Additionally, T-Mobile would determine where it will provide its own service and where it would rely on roaming to other MNOs. In roaming areas, T-Mobile and its MVNOs could find it difficult to maintain the quality of their customer experience and would need to pay substantial fees to use the other MNO.

13. Since Dish would essentially be reselling the T-Mobile's service, deficiencies in the service provided by the MNO would become unsolvable deficiencies in the MVNO's service. Enforcement would be difficult, and remedies may not be commensurate with the harm inflicted on the MVNO. Simply by underperforming or delaying response to resolving technical problems, the MNO could badly harm the MVNO. Any intentional or unintentional problems with the service could leave the MVNO damaged, with no alternative path to serve its customers.
14. From a business standpoint, the MVNO agreement would also effectively dictate the MVNO's pricing—because the price that the MVNO could charge would depend heavily on the fee (cost per gigabyte) the MNO charged the MVNO. Further, in their relationships with MVNOs, MNOs typically only seek ways to monetize their excess capacity where it exists—not to nurture the MVNOs. If, over the course of business, the MVNO were to require flexibility in the arrangement (e.g., new services, extensions, relief in costs, capacity changes, accommodations of changes in technical standards or equipment), the MNO would be unlikely to provide that relief.
15. Dish may thus struggle as an MVNO to provide differentiated services on T-Mobile's network if its differentiators were to require network-wide changes or custom operator support to implement (e.g., advanced streaming platforms, multimedia broadcast).
16. If Dish were able to reach an accommodation with T-Mobile on modifications to support new services, it would face the additional challenge of having to disclose sensitive intellectual property to a competitor in order to plan and implement the changes.

17. MVNOs often tolerate a highly dependent relationship with the MNO for reasons other than the profit they may make from the operation.¹ For example the MVNOs operated by the cable companies might not be financially sustainable on their own, but serve an important business purpose for the cable companies; for example, Comcast's MVNO relationship with Verizon enables Comcast to fill an urgent business gap (i.e., how to get wireless service to customers not near Comcast Wi-Fi and as an add-on to existing cable services for customer-retention purposes) but is not a central, money-making part of Comcast's business.

18. In some emerging MVNO models the MVNO would have more leverage with the MNO because it would offer a tangible asset to trade. For example, Altice has a partnership with Sprint in which Altice allows Sprint to install small cells on Altice's cable infrastructure in return for lower MVNO fees.² In contrast, in the first few years of its operations as an MVNO, Dish would have little or no leverage with T-Mobile to reduce its costs.

Dish's planned migration to an iMVNO model would potentially give it more control, but many risks will remain while Dish builds its network

¹ And for many MVNOs, the arrangement is not lucrative ("Comcast Lost \$743 Million on Xfinity Mobile in 2018," Daniel Frankel, *Multichannel News*, January 23, 2019, <https://www.multichannel.com/news/comcast-loses-over-1-billion-on-xfinity-mobile-in-1st-2-years>, accessed September 23, 2019.)

² "Sprint: Altice deal lets us cut through red tape of small-cell deployments," Colin Gibbs, *Fierce Wireless*, December 8, 2017, <https://www.fiercewireless.com/wireless/sprint-altice-deal-enables-us-to-cut-through-red-tape-small-cell-deployments>, accessed September 9, 2019. See also: Altice Ex Parte, 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, Jennifer Richter, Akin Gump, February 8, 2019, p. 14, [https://ecfsapi.fcc.gov/file/1020806336649/\(REDACTED\)%20Altice%20USA%20Inc.%20-%20Ex%20Parte%20Re%202.6%20and%202.7%20Meetings.pdf](https://ecfsapi.fcc.gov/file/1020806336649/(REDACTED)%20Altice%20USA%20Inc.%20-%20Ex%20Parte%20Re%202.6%20and%202.7%20Meetings.pdf), accessed September 25, 2019.

19. The agreements call for Dish's migration to an enhanced MVNO model, often called an iMVNO, in which Dish operates a 5G network core and is able to increase its control on the network and govern how its customers migrate to Dish's physical network, as it is built. Setting up the core network would be the first step toward Dish becoming independent, because it would enable Dish to activate sites—which would serve users with Dish bandwidth rather than over the T-Mobile network.

20. The core of a 5G network provides a wide range of functions that manage the network, determine the user experience, and manage users' ability to access different MNO radio access networks. Once it operates a core, Dish would be able to have its own SIM cards (or manage eSIM components in user devices) and manage authentication of individual user devices. It would determine what services are on its network. It would also be able to negotiate arrangements with other MNOs for capacity and coverage, if another MNO were willing to do so.

21. The agreements require Dish to "have deployed a core network" by June 14, 2022. More specificity is needed on the core network requirements (e.g., a demonstration of full operation of a core network) because, for example, activating core hardware and software is not the only challenge of activating a separate core network. Required verification of a fully operational core network should also include that a specified number of customers have migrated from the T-Mobile core to the Dish core, and that Dish, Boost, Sprint Prepaid, and Virgin mobile devices all are using the Dish core.

22. In addition, while the iMVNO model's functionality would give Dish more control, the degree of that control would depend critically on the degree to which Dish has built wireless sites and connected them.
23. Dish users would continue to use T-Mobile's radio access networks (e.g., cell sites, backhaul), but Dish could gradually migrate them away from T-Mobile. Since Dish is planning to build a 5G-only network, however, this migration is questionable and may come with a huge price sticker.
24. If Dish operates a 5G core as planned, that core would not support devices that are not 5G without a large-scale development of new, untried software and continued connectivity with the T-Mobile core. Thus, even after Dish begins to activate its own network, it would need to continue the MVNO arrangement with T-Mobile for all of its customers using 3G and 4G phones. And because some Dish customers—including current Boost MVNO customers—will be seeking to pay less for phones and services, many would not want to be forced to pay for a new phone, forcing Dish to extend the MVNO arrangement, or to push customers to upgrade phones (either incurring cost to subsidize the upgrade or losing customers who will not change).
25. Remaining on T-Mobile's network is not a solution for Dish, however. In a network where most of the antenna sites belong to T-Mobile or others, the available capacity and coverage and the terms of access to the network (whether Dish is an MVNO or an iMVNO) would still be under the control of the MNO.

26. Furthermore, other MNOs would not be under any obligation to make capacity available to Dish; MNOs other than Sprint have resisted the iMVNO model,³ so the ability of an iMVNO to connect to multiple MNOs may only be a theoretical advantage.

27. With regard to enforcement of the MVNO agreement as Dish migrates to an iMVNO, the agreement between Dish and T-Mobile would remain the same—as would the complexity of enforcement.

Dish's access to capacity on T-Mobile's network (and its pricing) would be critical to Dish's ability to deliver competitive services

28. Under DOJ's proposed solution, T-Mobile will provide capacity on its network to Dish for seven years on "favorable terms" — but those terms are not disclosed.

29. Once Dish activates its network core, the PFJ stipulates network capacity sharing so that Dish devices using the Dish network core can access the T-Mobile network. For network sharing to provide adequate service levels, however, Dish needs access to sufficient capacity, including where T-Mobile capacity is scarce. Insufficient capacity (whether because of intentional or unintentional action by the MNO) could badly damage Dish.

30. It would also be critical that T-Mobile's pricing of its shared capacity be fair and consistent—and that it does not stifle Dish's deployment. The pricing framework could be extremely complex, given that the market value of capacity may vary widely in

³ Altice Ex Parte, 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, January 28, 2019, Jennifer Richter, Akin Gump, Exhibit 1, p. 42, [https://ecfsapi.fcc.gov/file/1012865940796/\(REDACTED\)%20Altice%20USA%20Inc.%20-%20Supplemental%20Response%20to%20Information%20Request%20\(1.28.19\).pdf](https://ecfsapi.fcc.gov/file/1012865940796/(REDACTED)%20Altice%20USA%20Inc.%20-%20Supplemental%20Response%20to%20Information%20Request%20(1.28.19).pdf), accessed September 25, 2019.

different geographic areas, and in areas with different levels of existing broadband capacity.

31. Capacity sharing on the scale contemplated here has not been attempted in the United States among wireless providers, and we are not aware of an existing model for this type of collaboration and coordination between competitors. In the PFJ, this requirement is folded into the MVNO commitments, with the details again hidden from public review in the Full MVNO agreement.

Dish's access to T-Mobile's decommissioned sites may not add much value to Dish's expansion

32. Dish has FCC spectrum licenses but has not activated a wireless broadband network infrastructure. As it builds its network, it has the option to acquire sites from Sprint and T-Mobile—specifically, at least 20,000 sites that T-Mobile would decommission over the five years after the merger closing. For each site, Dish could choose to have the site lease or the lease plus the equipment.

33. DOJ's solution assumes that granting Dish site options would enable Dish's network expansion—but the utility and 5G-readiness of these sites is not guaranteed. Those sites are T-Mobile and Sprint's discards—sites that are being deactivated, likely because they are in less desirable locations, may not have high-quality fiber backhaul or backup power, or might be otherwise suboptimal for 5G. In fact, the PFJ speaks to “microwave backhaul”

at the sites⁴—implying that many sites may require extensive investment to become 5G-ready with fiber.

34. These sites might thus accelerate Dish’s deployment (e.g., by expediting the site selection and deployment processes) but might also re-create some of the deficiencies of Sprint’s network on the Dish network.

35. Enforcement of the agreement would thus require confirmation that T-Mobile is providing sites and equipment as promised and is complying with commitments and schedule—but also verification of the transferability of the leases, as well as verification that T-Mobile is taking the steps it is obligated to take to transfer the sites.⁵ Delays or changes in the turnover plans could create delays and drive up Dish’s costs.

DOJ anticipates Dish becoming a fourth facilities-based competitor comparable to Sprint—but this would take many years and would be fraught with execution risks

36. Dish’s execution risks are substantial. Under the most optimistic timeline, Dish would require at least a year to build a robust internal team, seek and select contractors, and prepare detailed designs and engineering. Dish would also need more than four years to deploy tens of thousands of sites with robust fiber backhaul to develop a reliable footprint that is not highly dependent on T-Mobile. That process would require extensive design, planning, procurement, site acquisition, and approvals—as well as an enormous capital investment.

⁴ Proposed Final Judgment (PFJ), IV.C.5, <https://www.justice.gov/opa/press-release/file/1187706/download>, accessed September 25, 2019.

⁵ PFJ, IV.C.

37. On July 30 and July 31, 2019, Dish staff met with FCC Commissioners and staff to discuss Dish's technical and business plans and to share an executive summary of the "RFI/P" Dish had earlier distributed to potential industry suppliers.⁶ Based on the executive summary of the RFI/P provided in the Ex Parte filing, we see that Dish is clearly still in a fact-finding stage—identifying which suppliers may be candidates for different parts of the build process, and asking wide-ranging questions about their potential roles. This type of document usually precedes engineering and design decisions, the development of more focused procurement documents, and the selection of contractors to supply materials and build the network.

38. In addition, the 3GPP Rev 16 equipment that Dish has said would be central to building a highly virtualized network with low operation costs⁷ relies on standards that will not be available until 2020, with actual equipment possibly not available until late 2020 or some point in 2021. Without that equipment, Dish would need to change its approach to a less virtualized network and, potentially, a different business model.

39. Dish's risk factors thus include activating infrastructure at tens of thousands of sites while relying on technologies that do not yet exist, scaling up from a relatively small mobile wireless staff to a large new team in a tight labor environment, getting permitting

⁶ "DISH 5G Network RFI/P Executive Summary," Dish Ex Parte, Federal Communications Commission, 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 1, 2019, Jeffrey H. Blum, p. 4, [https://ecfsapi.fcc.gov/file/10801235883258/2019-08-01%20DISH%20Ex%20Parte%20WT%20Docket%20No%2018-197%20\(w%20summary\).pdf](https://ecfsapi.fcc.gov/file/10801235883258/2019-08-01%20DISH%20Ex%20Parte%20WT%20Docket%20No%2018-197%20(w%20summary).pdf), accessed September 25, 2019.

⁷ Thomas A Cullen, EVP of Corporate Development, paragraph 9, in "Edited Transcript of Dish earnings conference call or presentation 29-Jul-19 8:30pm GMT," Thomson Reuters StreetEvents, July 30, 2019, <https://finance.yahoo.com/news/edited-transcript-dish-earnings-conference-081650500.html>, accessed September 25, 2019.

approvals, coordinating with T-Mobile (itself in the process of an ambitious buildout—which could limit T-Mobile’s resources available for coordinating with Dish), handling procurement, and financing a project likely to cost more than \$10 billion. In this light, it is worth considering other major communications infrastructure initiatives (e.g., Google Fiber) that failed to execute according to plan.

Dish’s nationwide buildout would be a significant challenge even under the best circumstances

40. As an example of the scope of Dish’s challenge, we note that T-Mobile operates approximately 64,000 macro sites and 21,000 distributed antenna and small cell sites as of December 31, 2018, and that this is therefore the approximate number of sites that a bona fide national MNO should have when fully operational.⁸ Acquisition of a new site typically takes 12 to 24 months—including the process of searching for a site, conducting RF engineering, acquiring approval and permits for the siting, acquiring fiber backhaul, and completing construction of the site.

41. Placing wireless equipment at an existing site (if there is space) still requires negotiating terms, RF engineering, permitting, engineering, and installation, and requires six to 18 months.

42. Similarly, placing equipment at one of T-Mobile or Sprint’s 20,000 discarded sites would require construction of fiber backhaul and upgrades and would still require local permitting and approvals and installation—which will take six to 18 months. And, as noted

⁸ T-Mobile U.S., Inc., U.S. SEC Form 10-K, p.7, <http://d18rn0p25nwr6d.cloudfront.net/CIK-0001283699/3bfba910-027f-4ec5-85a5-b8e91d073ba8.pdf>, accessed September 25, 2019.

in the PFJ, there may be instances where the site cannot be transferred by T-Mobile, and T-Mobile would be required to “cooperate with [Dish] in its attempt to obtain the rights.”⁹

There is also a risk to Dish that the tower owner may not agree to transfer the existing lease and may charge Dish higher costs since Dish is not an established player and is a higher-risk customer compared to existing MNOs, with no track record or credit in the industry.

43. Obtaining capacity in metro areas would require densification and small cells—which usually are not shared and would likely only happen in a second phase of capacity densification after Dish’s coverage requirement is met. Small cells have streamlined site acquisition and make-ready processes but would still require fiber construction—likely six to 12 months after macro sites are activated and designs are complete.

Dish faces technical and logistical challenges in deploying its planned network architecture

44. The equipment required to operate a network over the Dish spectrum is not currently mass-produced—Dish would to develop a set of requirements and work with companies like Nokia and Ericsson to start assembly of base station equipment.

45. Handset equipment (i.e., smartphones) is not currently manufactured for Dish’s spectrum bands. Dish would have to work with suppliers like Apple and Samsung, which offer volume-based pricing. As a result, the new Dish device portfolio would be expensive in its initial rollout.

⁹ PFJ, IV.C.4.

46. Relying entirely on a virtualized 5G architecture that has not yet been deployed increases risk of execution, with less flexibility to back out and use a different technology. There is a scenario in which unacceptable delays in Rev 16 or other changes in the business plan (e.g., away from virtualization) would require a redesign or reboot of the build, which would cause a delay of months or years.

47. There is also a possibility that developers and deployers of 5G may adopt a “new cyber duty of care” and make changes in their development and supply chain strategies to enhance cyber security to address the new risks posed by 5G networking and applications.¹⁰ Implementing changes in cyber security in hardware and software may add time to the development and production of equipment and software while cybersecurity risks are assessed and changes in design and architecture are made to address problems and increase preparedness. In this scenario, 5G early adopters introducing cutting-edge technologies might slow deployment while tried-and-true 4G operators would continue to operate broadband wireless networks. Dish might be contractually protected by the “unanticipated circumstances” described in Dish’s letter to DOJ (Attachment A, VII, Verification Metrics (B)),¹¹ but a delay in 5G deployment would mean additional years of delay in the public having a broadband competitor—or even lead to Dish needing to radically change its model or cancel deployment.

¹⁰ “Why 5G requires new approaches to cybersecurity: Racing to protect the most important network of the 21st century,” Tom Wheeler and David Simpson, Brookings Institution, September 3, 2019, <https://www.brookings.edu/research/why-5g-requires-new-approaches-to-cybersecurity/>, accessed September 25, 2019.

¹¹ Dish letter to Federal Communications Commission, Jeffrey H. Blum, July 26, 2019, <https://www.fcc.gov/sites/default/files/dish-letter-07262019.pdf>

Dish's limited buildout and capacity requirements are too limited for a robust fourth competitor

48. As mentioned above, operating an independent Dish network would require deploying tens of thousands of sites with robust fiber connectivity. Even with a supply of decommissioned Sprint and T-Mobile sites, this would be an enormous challenge.

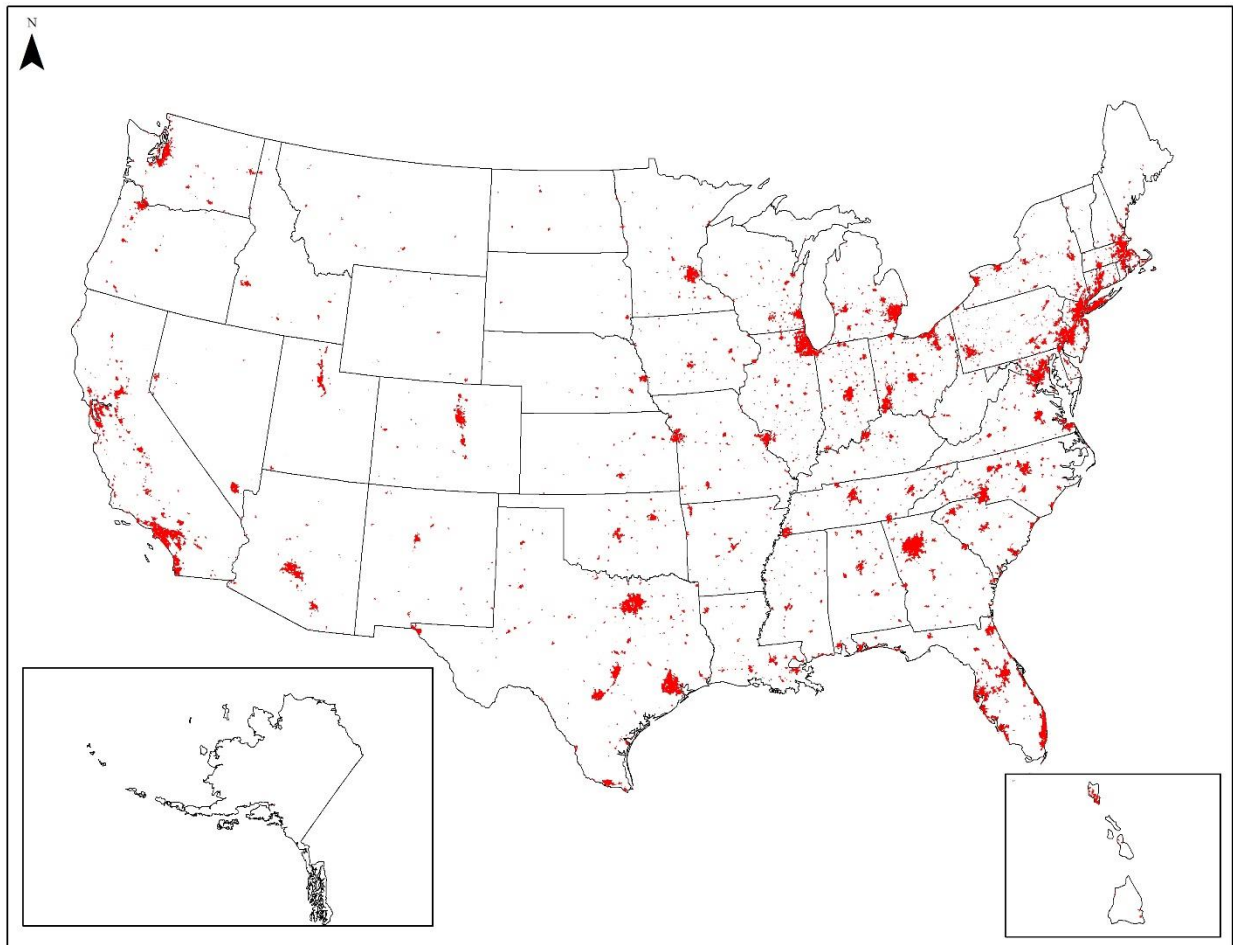
49. The benchmarks established in the Dish letter begin with a requirement that by June 14, 2022, Dish will cover 20 percent of the population with its own wireless facilities and activate its core network. The benchmark includes no number of towers, no speeds, and no detail on verification or test approaches—just an indication that Dish will use AWS and 700 MHz spectrum. The service is described as “5G Broadband Service,” which is defined only as meaning “at least 3GPP Release 15 capable of providing Enhanced Mobile Broadband (eMBB) functionality”; the letter says nothing about speeds, how many customers the network will support, or other critical metrics. For example, it does not differentiate at all between a thin internet of things (IoT) network and a dense broadband network capable of serving as many people and providing comparable speeds to what the four major MNOs offer today.

50. The next significant performance benchmark is that by June 14, 2023, Dish will have activated 15,000 sites and will be providing 35 Mbps service to 70 percent of the U.S. population. The speed would be verified by drive test, using a methodology approved by the FCC and determined to reflect the actual user experience. Although the metrics for the 2023 requirements are better defined than the 2022 requirements, it is still not clear whether testing would be performed on a loaded network, whether tests would be

required at the cell edge, whether testing would be done at peak times, or how many locations would be tested.

51. It is critical to note that the 2023 benchmark stops well short of the scale of the networks operated by the four existing MNOs. For example, the most straightforward way to serve 70 percent of the population is to focus on urban areas. If Dish were to serve only the country's densest census blocks, a service map of 70 percent of the population would be only the red areas in Figure 1 below.

Figure 1: Illustration of 70 Percent Nationwide Coverage Based Solely on Urban Areas



52. We note, too, that 35 Mbps is substantially lower than the speeds provided by many mobile broadband providers today, and compares poorly to the hundreds of Mbps forecast for T-Mobile and Sprint during the same period in T-Mobile's public interest statement, which states that absent the merger, Sprint would provide average speeds of 55 Mbps and peak speeds of 300 Mbps, and in 2024, absent the merger, would deliver average speeds of 113 Mbps and peak speeds of 700 Mbps.¹²
53. Providing a low minimum required speed of 35 Mbps, instead of the speeds likely to be offered by the other MNOs, creates the risk of Dish building something other than a fully competitive broadband network—such as an IoT network that does not provide the capacity of a full broadband network (as had previously been considered publicly by Dish) or a specialized wholesale provider of capacity for other networks that focuses exclusively on high-density, high-value areas.
54. The last major performance milestones are the requirements to serve 70 percent of the population of each Partial Economic Area (PEA) (by June 14, 2023) and 75 percent of the population of each PEA (by June 14, 2025) with 5G using the 600 MHz band. While these requirements would require activation of service in a more widespread way than shown in Figure 1, they still could be met with a small incremental number of sites relative to the other service requirements—for example, by activating a few sites in each PEA at high power. Again, that type of deployment could serve an IoT network with devices

¹² Public Interest Statement, June 18, 2018, p. 44-45, [https://ecfsapi.fcc.gov/file/10618281006240/Public%20Interest%20Statement%20and%20Appendices%20A-J%20\(Public%20Redacted\)%20.pdf](https://ecfsapi.fcc.gov/file/10618281006240/Public%20Interest%20Statement%20and%20Appendices%20A-J%20(Public%20Redacted)%20.pdf), accessed September 25, 2019.

using low bandwidth over a large area. The benchmark does not define a speed or how many towers will be required, nor does it provide details on testing or enforcement—it only requires “5G broadband service” which, as noted above, is only defined as a protocol, not with any standard of performance.

The MVNO Agreement would require robust, long-term oversight

55. Finally, we note that, because the MVNO Agreement would cover a wide range of technical terms, it will require considerable effort for the government’s overseeing entity—the Monitoring Trustee—to enforce.

56. Regarding the use of devices, for example, the PFJ states (V.B.4): “[T-Mobile] shall not unreasonably refuse to allow any device used by Acquiring Defendant’s customers to access the Divesting Defendants’ wireless networks, or otherwise unreasonably refuse to approve or support any such devices, and shall approve such devices for use upon request as soon as reasonably practicable, and shall use commercially reasonable efforts to provide technical support or other assistance to the Acquiring Defendant as requested to facilitate approval of any devices for use on Divesting Defendants’ wireless networks[.]”

57. We note that “unreasonably,” “as soon as reasonably practicable,” and “commercially reasonable efforts” are not quantitatively defined and would require significant efforts by the Monitoring Trustee to interpret and mediate.

58. As a further indication of the need for robust monitoring, we note that the terms that govern T-Mobile and Dish’s agreement would cover a wider range of topics compared to most existing roaming and peering agreements, including delivery of capacity nationally

(and in the right places at the right times), appropriate prioritization of capacity, managing a wide range of user devices and generations of wireless base station equipment, and accommodating an ongoing migration from T-Mobile sites to Dish sites, all while T-Mobile merges its network with Sprint's and performs its own 5G upgrade. Enforcement of the agreement would require the Monitoring Trustee to have full visibility into all the parties' networks and their configuration. And because poor network performance can have a major impact on Dish as a new entrant, the enforcement would need to be quick and decisive.

59. Finally, the PFJ also states (VI.B.6): “[T-Mobile] shall not otherwise unreasonably delay, impede, or frustrate Acquiring Defendant’s ability to use any Full MVNO Agreement and the Divesting Defendants’ networks to become a nationwide facilities-based retail mobile wireless services provider,” a wide-ranging charge that may be interpreted very differently by the parties. It would be a strenuous task for the Monitoring Trustee to interpret and enforce this complex and ambitious framework over a period of years, all along making decisions and acting quickly enough to protect a party that is being damaged.

DATED: October 8, 2019



Andrew Afflerbach, Ph.D., P.E.

Attachment A: CV

**Andrew Afflerbach, Ph.D., P.E. | CEO and Chief Technology Officer
CTC Technology & Energy**

Dr. Andrew Afflerbach specializes in the planning, designing, and implementation oversight of broadband communications networks, smart cities strategies, and public safety networks. His expertise includes state-of-the-art fiber and wireless technologies, the unique requirements of public safety networks, and the ways in which communications infrastructure enables smart and connected applications and programs for cities, states, and regions.

Andrew has planned and designed robust and resilient network strategies for dozens of clients, including state and local governments and public safety users. He has delivered strategic technical guidance on wired and wireless communications issues to cities, states, and national governments over more than 20 years. He has advised numerous cities and states, including New York City, San Francisco, Seattle, Atlanta, Washington, D.C., and Boston, and served as a senior adviser to Crown Fibre Holdings, the public entity directing New Zealand's national fiber-to-the-home project.

In addition to designing networks, Andrew testifies as an expert witness on broadband communications issues. And he is frequently consulted on critical communications policy issues through technical analyses submitted to the Federal Communications Commission (FCC) and policymakers. He has prepared white papers on:

- Estimating the cost to expand fiber to underserved schools and libraries nationwide
- Conducting due diligence for the IP transition of the country's telecommunications infrastructure
- Developing technical frameworks for wireless network neutrality
- Streamlining deployment of small cell infrastructure by improving wireless facilities siting policies
- Limiting interference from LTE-U networks in unlicensed spectrum

As CTC's Chief Technology Officer, Andrew oversees all technical analysis and engineering work performed by the firm. He has a Ph.D. and is a licensed Professional Engineer.

Fiber Network Planning and Engineering

Andrew has architected and designed middle- and last-mile fiber broadband networks for the District of Columbia (Washington, D.C.); the city of San Francisco; the Delaware Department of Transportation; the Maryland Transportation Authority; and many large counties.

He oversaw the development of system-level broadband designs and construction cost estimates for the cities of Atlanta, Boston, Boulder, Palo Alto, Madison, and Seattle; the states of Connecticut and Kentucky; and many municipal electric providers and rural communities. He is overseeing the detailed design of the city-built fiber-to-the-premises (FTTP) networks in

Westminster, Maryland; Alford, Massachusetts; and Holly Springs and Wake Forest, North Carolina.

In Boston, Andrew led the CTC team that developed a detailed RFP, evaluated responses, and participated in negotiations to acquire an Indefeasible Right of Use (IRU) agreement with a fiber vendor to connect schools, libraries, public housing, and public safety throughout the City. This approach was designed to allow the City to oversee and control access and content among these facilities.

Wireless Network Planning and Engineering

Applying the current state of the art—and considering the attributes of anticipated future technological advancements such as “5G”—Andrew has developed candidate wireless network designs to meet the requirements of clients including the cities of Atlanta, San Francisco, and Seattle. In a major American city, Andrew led the team that evaluated wireless broadband solutions, including a wireless spectrum roadmap, to complement potential wired solutions.

In rural, mountainous Garrett County, Maryland, Andrew designed and oversaw the deployment of an innovative wireless broadband network that used TV white space spectrum to reach previously unserved residents. To enhance public internet connectivity, Andrew provides technical oversight on CTC’s Wi-Fi-related projects, including the design and deployment of Wi-Fi networks in several parks in Montgomery County, Maryland.

Andrew also advises local and state government agencies on issues related to wireless attachments in the public rights-of-way; he leads the CTC team that supports the Texas Department of Transportation (TxDOT) and many large counties on wireless attachment policies and procedures.

Public Safety Networking

Andrew leads the CTC team providing strategic and tactical guidance on FirstNet (including agency adoption and other critical decision-making) for the State of Delaware and Onondaga County, New York. In the District of Columbia, he and his team evaluated the financial, technical, and operational impact of building the District’s own public safety broadband network, including the design of an LTE system that provided public-safety-level coverage and capacity citywide. This due diligence allowed the District to make an informed decision regarding opting in or out of the National Public Safety Broadband Network.

Andrew currently is working with the State of Delaware to evaluate LTE coverage gaps throughout the state to assist agencies in their choice of public safety broadband networks. On the state’s behalf, he and his team are also conducting outreach to AT&T and other carriers to evaluate their public safety offerings. He is performing similar work as part of CTC’s engagement

with El Paso County, Colorado.

Earlier, Andrew led the CTC team that identified communications gaps and evaluated potential technical solutions for the Baltimore Urban Area Security Initiative (UASI), a regional emergency preparedness planning effort funded by the U.S. Department of Homeland Security (DHS).

He previously served as lead engineer and technical architect for planning and development of NCRnet, a regional fiber optic and microwave network that links public safety and emergency support users throughout the 19 jurisdictions of the National Capital Region (Washington, D.C. and surrounding jurisdictions), under a DHS grant. He wrote the initial feasibility studies that led to this project for regional network interconnection.

Smart Grid

Andrew and the CTC team provided expert testimony and advisory services to the Public Service Commission of Maryland regarding Advanced Metering Infrastructure (AMI). CTC provided objective guidance to the staff as it evaluated AMI applications submitted by three of the state's investor-owned utilities (IOUs). This contract represented the first time the PSC staff had asked a consultant to advise them on technology—a reflection of the lack of standards in the Smart Grid arena.

Broadband Communications Policy Advisory Services

Andrew advises public sector clients and a range of policy think tanks, U.S. federal agencies, and non-profits regarding the engineering issues underlying key communications issues. For example, he:

- Provided expert testimony to the FCC in the matter of the preparation of the **national broadband plan** as a representative of the National Association of Counties (NACo) and the National Association of Telecommunications Officers & Advisors (NATOA).
- Served as expert advisor regarding broadband deployment to the U.S. Conference of Mayors, NACo, National League of Cities, Public Knowledge, New America Foundation Open Technology Institute, and NATOA in those organizations' filings before the FCC in the matter of determination of the deployment of a **national, interoperable wireless network in the 700 MHz spectrum**.
- In connection with the FCC's ongoing **Open Internet proceeding**, advised the New America Foundation regarding the technical pathways by which "any device" and "any application" regimes could be achieved in the wireless broadband arena as they have been in the wireline area.
- Provided expert technical advice on the **700 MHz broadband and AWS-3 proceedings** at the FCC for the Public Interest Spectrum Coalition (including Free Press, the New America Foundation, Consumers Union, and the Media Access Project).
- Served as technical advisor to the **U.S. Naval Exchange** in its evaluation of vendors' broadband communications services on U.S. Navy bases worldwide.
- Advised the **U.S. Internal Revenue Service** regarding the history of broadband and cable deployment and related technical issues in that agency's evaluation of appropriate

regulations for those industries.

- Advised the Stanford Law School Center for Internet and Society on the technical issues for their briefs in the **Brand X Supreme Court appeal** regarding cable broadband.

Broadband Communications Instruction

Andrew has served as an instructor for the U.S. Federal Highway Association/National Highway Institute, the George Washington University Continuing Education Program, the University of Maryland Instructional TV Program, ITS America, Law Seminars International, and the COMNET Exposition. He developed curricula for the United States Department of Transportation.

He taught and helped develop an online graduate-level course for the University of Maryland. He developed and taught communications courses and curricula for ITS America, COMNET, and the University of Maryland. His analysis of cable open access is used in the curriculum of the International Training Program on Utility Regulation and Strategy at the University of Florida.

Andrew has also prepared client tutorials and presented papers on emerging telecommunications technologies to the National Fire Protection Association (NFPA), NATOA, the National League of Cities (NLC), the International City/County Management Association (ICMA), and the American Association of Community Colleges (AACC). He taught college-level astrophysics at the University of Wisconsin.

EMPLOYMENT HISTORY

1995–Present	CEO/Chief Technology Officer, CTC Previous positions: Director of Engineering, Principal Engineer, Senior Scientist
1990–1996	Astronomer/Instructor/Researcher University of Wisconsin–Madison, NASA, and Swarthmore College

EDUCATION

Ph.D., Astronomy, University of Wisconsin–Madison, 1996

- NASA Graduate Fellow, 1993–1996. Research fellowship in astrophysics
- Elected Member, Sigma Xi Scientific Research Honor Society

Master of Science, Astronomy, University of Wisconsin–Madison, 1993

Bachelor of Arts, Physics, Swarthmore College, 1991

- Eugene M. Lang Scholar, 1987–1991

PROFESSIONAL CERTIFICATIONS/LICENSES

Professional Engineer, states of Delaware, Georgia, Maryland, Illinois, and Virginia

HONORS/ORGANIZATIONS

- Disaster Response and Recovery Working Group, FCC's Broadband Deployment Advisory Committee (BDAC)
- Association of Public-Safety Communications Officials (APCO)
- Board of Visitors, University of Wisconsin Department of Astronomy
- National Association of Telecommunications Officers and Advisors (NATOA) Technology and Public Safety Committees
- Armed Forces Communications and Electronics Association (AFCEA)
- Society of Cable and Telecommunications Engineers (SCTE)
- Institute of Electrical and Electronic Engineers (IEEE)
- Charleston Defense Contractors Association (CDCA)

SELECTED PUBLICATIONS, PRESENTATIONS, and COURSES

- "SB 937: Wireless Facilities – Installation and Regulation," Testimony before the State of Maryland Senate, Feb. 2019
- "HB 654: Wireless Facilities – Installation and Regulation," Testimony before the State of Maryland General Assembly, Feb. 2019
- "The Three "Ps" of Managing Small Cell Applications: Process, Process, Process," Dec. 2018
- Declaration in Response to FCC's Order, "Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment," prepared for the Smart Communities and Special Districts Coalition, filed with the FCC, Sept. 2018
- Declaration in Response to the Proposed T-Mobile/Sprint Merger, prepared for the Communications Workers of America, filed with the FCC, Aug. 2018
- "A Model for Understanding the Cost to Connect Anchor Institutions with Fiber Optics" (co-author), prepared for the Schools, Health & Libraries Broadband Coalition, Feb. 2018
- "How Localities Can Prepare for—and Capitalize on—the Coming Wave of Public Safety Network Construction," Feb. 2018
- "Network Resiliency and Security Playbook" (co-author), prepared for the National Institute of Hometown Security, Nov. 2017
- "Mobile Broadband Service Is Not an Adequate Substitute for Wirelines" (co-author; addressing the limitations of 5G), prepared for the Communications Workers of America, Oct. 2017
- "Technical Guide to Dig Once Policies," April 2017
- "Streamlining Deployment of Small Cell Infrastructure by Improving Wireless Facilities Siting Policies," prepared for the Smart Communities Siting Coalition, filed with the FCC, March 2017
- "How Localities Can Improve Wireless Service for the Public While Addressing Citizen Concerns," Nov. 2016
- "LTE-U Interference in Unlicensed Spectrum: The Impact on Local Communities and Recommended Solutions," prepared for WifiForward, Feb. 2016

- “Mobile Broadband Networks Can Manage Congestion While Abiding by Open Internet Principles,” prepared for the New America Foundation’s Open Technology Institute – Wireless Future Project, filed with the FCC, Nov. 2014
- “The State of the Art and Evolution of Cable Television and Broadband Technology,” prepared for Public Knowledge, filed with the FCC, Nov. 2014
- “A Model for Understanding the Cost to Connect Schools and Libraries with Fiber Optics,” prepared for the Schools, Health & Libraries Broadband Coalition, filed with the FCC, Oct. 2014
- “The Art of the Possible: An Overview of Public Broadband Options,” prepared jointly with the New America Foundation’s Open Technology Institute, May 2014
- “Understanding Broadband Performance Factors,” with Tom Asp, *Broadband Communities* magazine, March/April 2014
- “Engineering Analysis of Technical Issues Raised in the FCC’s Proceeding on Wireless Facilities Siting,” filed with the FCC (<http://apps.fcc.gov/ecfs/document/view?id=7521070994>), Feb. 2014
- “A Brief Assessment of Engineering Issues Related to Trial Testing for IP Transition,” prepared for Public Knowledge and sent to the FCC as part of its proceedings on Advancing Technology Transitions While Protecting Network Values, Jan. 2014
- “Gigabit Communities: Technical Strategies for Facilitating Public or Private Broadband Construction in Your Community,” prepared as a guide for local government leaders and planners (sponsored by Google), Jan. 2014
- “Critical Partners in Data Driven Science: Homeland Security and Public Safety,” submitted to the *Workshop on Advanced Regional & State Networks (ARNs): Envisioning the Future as Critical Partners in Data-Driven Science*, Internet2 workshop chaired by Mark Johnson, CTO of MCNC, Washington, D.C., April 2013
- “Connected Communities: How a City Can Plan and Implement Public Safety & Public Wireless,” submitted to the International Wireless Communications Exposition, Las Vegas, March 2013
- “Cost Estimate for Building Fiber Optics to Key Anchor Institutions,” prepared for submittal to the FCC by NATOA and SHLB, Sept. 2009
- “Efficiencies Available Through Simultaneous Construction and Co-location of Communications Conduit and Fiber,” prepared for submittal to the FCC by the National Association of Telecommunications Officers and Advisors and the City and County of San Francisco, 2009, referenced in the National Broadband Plan
- “How the National Capital Region Built a 21st Century Regional Communications Network” and “Why City and County Communications are at Risk,” invited presentation at the FCC’s National Broadband Plan workshop, Aug. 25, 2009