

REDACTED – FOR PUBLIC INSPECTION

September 19, 2019

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VIA ECFS

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

Re: *Misuse of Internet Protocol (IP) Captioned Telephone Service*, CG Docket No. 13-24;
Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities, CG Docket No. 03-123

Dear Ms. Dortch:

CaptionCall, LLC herein submits a REDACTED version of a notice of ex parte and appendices in the above-referenced proceedings.

CaptionCall is submitting a Highly Confidential version of this notice of ex parte and appendices pursuant to the *Third Protective Order* adopted for the above-captioned dockets.¹ CaptionCall has received written approval from staff to designate for Highly Confidential treatment the marked portions of the attached ex parte, which include “[g]ranular information about [its] past [and] . . . future costs, revenues, . . . [and] market share.”²

Pursuant to the *Third Protective Order*, CaptionCall is submitting the Highly Confidential version for the Secretary and two copies for Eliot Greenwald. Encrypted electronic copies of the Highly Confidential Documents are also being sent by email as set forth below.

¹ See *In re Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Order and Third Protective Order, CG Docket Nos. 03-123, 10-51, 13-24, DA 18-751 (2018) (“*Third Protective Order*”).

² *Third Protective Order* Appendix B.

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Please contact me if you have any questions or require any additional information.

Sincerely,
/s/ Rebekah. P. Goodheart
Rebekah P. Goodheart
Counsel for CaptionCall, LLC

Enclosures

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*Telecommunications Relay Services and Speech-to-Speech Services for Individuals with
Hearing and Speech Disabilities*, CG Docket No. 03-123

Dear Ms. Dortch:

On September 17, 2019, Dr. Gregory Rosston of Stanford University, an Outside Consultant to CaptionCall, LLC, as well as Elliot S. Tarloff and the undersigned of Jenner & Block LLP, Outside Counsel to CaptionCall, met with Joseph Calascione, acting Wireline Advisor to Commissioner Carr; Arielle Roth, Wireline Legal Advisor to Commissioner O’Rielly; Travis Litman, Chief of Staff and Senior Legal Advisor to Commissioner Rosenworcel; and Michael Carowitz, Special Counsel to Chairman Pai. On September 18, 2019, we met with Eliot Greenwald, Michael Scott, Diane Burstein, and Bob Aldrich of the Consumer and Governmental Affairs Bureau; Giulia McHenry, Eliot Maenner, Virginia Metallo, Susan Lee, Margaret Wiener, and Martha Stancill, of the Office of Economics and Analytics; and David Schmidt (via phone) of the Office of the Managing Director; and separately, Randy Clarke, Wireline Advisor to Commissioner Starks.¹

During the meetings, we discussed CaptionCall’s proposal for the Commission to set IP CTS compensation rates to create or approximate market-based incentives for providers to invest in innovation and efficiency by adopting a three-to-five year price cap, followed by setting rates

¹ In the meetings with Joseph Calascione and Randy Clarke, CaptionCall provided a copy of its Auction Proposal submitted with its Comments in the above-referenced dockets. See Andrzej Skrzypacz, *Reverse Auction Proposal for Setting IP CTS Rates* at 7 n.24 (Sept. 17, 2018), appendix D to Comments of CaptionCall, LLC, CG Docket Nos. 13-24, 03-123 (Sept. 17, 2019) (“CaptionCall Comments”). A copy of the Auction Proposal is attached hereto as Appendix A.

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through a reverse auction.² As Professors Skrzypacz and Rosston explain in the attached report, the Commission should not set rates based on providers' allowable costs, which would be a major step backward in the Commission's trajectory of moving to market-based rates and allocations in many different contexts. Nor should the Commission adopt tiered rates for IP CTS, which would conflict with the Commission's goals for the IP CTS program; make no sense for the IP CTS market, given its differences from the VRS market; and effectively amount to rewarding inefficient providers at the cost of consumers and the TRS Fund. Finally, if the Commission nonetheless sets rates based on providers' allowable costs—which it should not—it should allow vertically integrated and non-vertically integrated innovators alike to receive payment for the value of their innovations in a symmetrical and competitively neutral manner. Such an approach will maximize innovation for consumers and savings for the TRS Fund.

I. The Commission Should Continue to Set Rates for IP CTS that Create or Approximate Market-Based Incentives for Providers.

Over a decade ago, the Commission recognized the benefits to the TRS Fund and consumers of setting rates that create or approximate market-driven incentives to invest in innovation and efficiency.³ While the specific MARS methodology has become obsolete, the record in this proceeding confirms and underscores the importance of continuing this approach going forward—first, by adopting a three-to-five year price cap for IP CTS, and then by setting rates using a reverse auction.

A. The Record Underscores the Benefits of Maintaining Market-Based Pricing Through a Three-to-Five Year Price Cap to Create Incentives for Providers to Invest in Innovation and Efficiency-Maximizing Technologies.

The Commission's adoption of the MARS rate-setting methodology for IP CTS in 2007 reflected a larger regulatory trend toward market- and incentive-based rate setting and policy making.⁴ This approach has yielded numerous benefits in a variety of contexts, and the

² As Professor Rosston explained during the meetings, and as set forth below and in the attached report, criticisms of Professor Skrzypacz's proposal for a reverse auction for IP CTS minutes to new users (the "Auction Proposal") appear to be based on misunderstandings of the proposal and/or the IP CTS market. Contrary to their arguments, the Auction Proposal is not designed to result in only two providers in the market; it is designed specifically to facilitate competition and market entry—and not to force any existing users to switch providers.

³ See *In re Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Report and Order and Declaratory Ruling, 22 FCC Rcd 20,140 (2007).

⁴ See Letter from Randolph J. May, President, the Free State Foundation, to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 03-123, App. A (Sept. 5, 2019) (Randolph J. May, *Reforming the FCC's Internet Protocol*

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Commission should not revert to allowed cost-based rate setting: “In order to accomplish its reformist goal of modernizing the IP CTS program, the Commission should adopt . . . a compensation rate for participating service providers that replicate a rate that would prevail in a competitive free market.”⁵ In contrast, the Commission’s proposal to base rates on providers’ allowed costs would set perverse incentives and result in “unending—sometimes seemingly metaphysical—disputes regarding the proper cost accounting systems, cost allocation methodologies, the accuracy of demand data, the reasonableness of expenses, and so forth.”⁶

As the easiest path forward to achieve its goals, the Commission should start by adopting a three-to-five year price cap for IP CTS providers, based on the proposal CaptionCall submitted in its comments.⁷ This proposal garnered strong support on the record.⁸ Professors Skrzypacz and Rosston agree that the Commission could use a price cap as a bridge to an auction-set rate, noting that “uniform flat rates” under a price cap “will provide efficiency-enhancing incentives and push minutes to low-cost providers, saving the TRS Fund money over the longer term.”⁹ The Free State Foundation agrees: “[A] properly formulated price cap regime . . . creates incentives for the service providers to become more innovative and efficient.”¹⁰ In order to do so, however “the initial price cap period must be long enough to create sufficient stability for the service providers to devise and implement innovations and cost-saving measures”—precisely as CaptionCall’s price cap proposal would do.¹¹

B. After the Price Cap Term, the Commission Should Conduct a Reverse Auction.

After the initial price cap term, the Commission should set IP CTS rates through a reverse auction based on the Auction Proposal. “It is universally accepted by economists that competitive bidding in auctions is a means of replicating an efficient market with regard to the

Captioned Telephone Service Program, at 5-6 (2019) (“*FSF Perspectives*”) (citing Commission precedent favoring price cap regulation over allowed cost-based rate setting)).

⁵ *FSF Perspectives* at 7.

⁶ *FSF Perspectives* at 5.

⁷ See CaptionCall Comments at Parts VI.A-C.

⁸ See Reply Comments of CaptionCall, LLC, CG Docket Nos. 13-24, 03-123, at 15-20 (Oct. 16, 2018) (“CaptionCall Reply Comments”).

⁹ Gregory L. Rosston & Andrzej Skrzypacz, *Methodology for Setting IP CTS Rates* 31 (Sept. 19, 2019) (“Skrzypacz and Rosston Report”). The Skrzypacz and Rosston Report is attached as Appendix B.

¹⁰ *FSF Perspectives* at 5.

¹¹ *Id.* at 6 & n.20.

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distribution of scarce resources.”¹² Moreover, the Commission has had tremendous successes putting this principle into practice in a variety of contexts, designing forward and reverse auctions for, among other things, wireless spectrum and universal service subsidies.¹³ The Commission should build on these successes in the IP CTS program.

CaptionCall submitted the Auction Proposal, developed by a world-renowned auction expert, Professor Skrzypacz, for what such an auction should look like to maximize efficiency without sacrificing service quality or healthy competition in the IP CTS market.¹⁴ The auction would start with the Commission’s using a reserve price as the opening rate and then reduce the rate every successive round until there are fewer than two bidders. The winning rate would be the lowest rate prior to the closing round—ensuring that at least two bidders win the auction, and preserving competition in the market. In addition, they propose that additional bidders within, for example, 5 or 10 percent of the winning rate would also be winning bidders.

Winning bidders would be able to add new subscribers and to receive compensation for their minutes at the winning rates; losing bidders would be able to continue serving their existing customers at the winning rate and would be able to add new subscribers, but not for compensation. Small providers and new entrants could choose to be treated as winning bidders and to add new subscribers for compensation at the winning rate without participating in the auction.¹⁵

Criticisms of the Auction Proposal miss the mark, and appear to misapprehend its design parameters and/or the IP CTS market more generally.

First, as Professors Skrzypacz and Rosston explain, ClearCaptions’ expert, Dr. David J. Salant, correctly identifies some of the principles that should guide the Commission’s rate setting

¹² *Id.* at 6.

¹³ *See id.* at 7.

¹⁴ *See* Andrzej Skrzypacz, *Reverse Auction Proposal for Setting IP CTS Rates* at 7 n.24 (Sept. 17, 2018), appendix D to CaptionCall Comments; *see also FSF Perspectives* (urging the Commission to give “Professor Skrzypacz’s proposal . . . serious consideration”).

¹⁵ These parameters were specifically designed for the IP CTS marketplace. While it is impossible to predict the actual outcome of any auction, Professors Skrzypacz and Rosston have presented a hypothetical auction involving five bidders with different reservation prices based on their marginal costs: “These simple calculations show that the auction could drive cost reductions without major disruptions of the market”; indeed, even losing bidders could “stay active in the market, provided that they can negotiate better contracts or reduce their costs in another way” and then “come back to the market for new customers in the next auction.” Skrzypacz and Rosston Report at 32. In contrast, as Professors Skrzypacz and Rosston explain, the illustrative examples of auction outcome presented by Dr. Salant are flawed and “have no basis in the reality of the costs or provision of IP CTS.” *Id.* at 38.

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for IP CTS.¹⁶ But his application of these principles here is misguided. As a threshold matter, Dr. Salant “provides no support for his description that the IP CTS market is featured by imbalanced market shares, significant fixed costs and economies of scale”—necessary but not sufficient conditions for the introduction of tiers (as discussed below).¹⁷ Indeed, the data that are available to the Commission show that “given the current minutes served by the providers, there is no evidence of significant economies of scale.”¹⁸ An auction thus sets a level playing field for any provider, large or small, that can achieve efficiencies.

Second, ClearCaptions’ claims regarding the effects of auction-based rates on the market are also without merit. For example, ClearCaptions argues that an auction would make future entry impossible. Not so. As Professors Skrzypacz and Rosston explain, auction-based rates would provide new entrants with a stable environment for competitive entry.¹⁹ ClearCaptions and Dr. Salant are also incorrect to claim that the auction would result in only two or three winning bidders. “An important element of the Auction Proposal is that it is flexible to allow several winners” including potentially the fourth and fifth providers, depending on their break-even points and the percentage within the winning bid that the Commission selects.²⁰ But ClearCaptions’ argument that losing bidders should be allowed to serve new customers at the winning rates would not only blunt the cost-saving effects of an auction but would also reduce the benefits of winning of the auction: “If the losing bidders could provide service at the same

¹⁶ See Rebuttal Report of David J. Salant ¶¶ 11, 37 (Oct. 31, 2018), exhibit 2 to letter from Paul C. Besozzi and Peter Bean, Counsel for ClearCaptions, to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 10-51, and 03-123 (Nov. 7, 2018).

¹⁷ Skrzypacz and Rosston Report at 34 (quotation marks omitted).

¹⁸ *Id.* at 34; see also *id.* at 9 (“[M]ost differences in costs are attributable to differences in skills and experience of managing call centers, prior investments in technology and business processes, and/or different business models . . . than to differences in scale.”); Coleman Bazelon & Brent Lutes, *Economic Considerations of IP CTS Rate Structure and Methodology* 36 (Mar. 27, 2019) (“First Brattle Report”), exhibit 1 to letter from Brent Lutes, Associate, The Brattle Group to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 10-51, and 03-123 (Mar. 27, 2019). Moreover, even if there were economies of scale in IP CTS, Dr. Salant also fails to explain why the benefits of scale cannot be achieved without tiers, given the option to license from a party with scale (*i.e.*, Ultratec) and the large and growing demand for IP CTS, as discussed below.

¹⁹ Skrzypacz and Rosston Report at 35-36. Even if the auction-based rates were too low to permit new entry—and if the Commission determines that, for some reason, there is a need for additional providers (despite the fact that there are five incumbents with competitive market share)—the problem could be redressed through the incorporation of transparent, short-lived subsidies into the auction design. See *id.* at 35.

²⁰ *Id.* at 37.

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rate as the winning bidders, every provider would have the incentive to bid very high,” because there would be no consequence for losing.²¹

Finally, ClearCaptions’ predictions about the customer-facing impacts of an auction are wrong. The Auction Proposal would not force customers to switch providers: It expressly “allows losing bidders to provide service to existing customers and puts safeguards to assure incumbents would have the time to react to new rates without disruption of business.”²² Nor would the auction reduce incentives for competition between providers in terms of quality, features, or convenience. As Professors Skrzypacz and Rosston explain, “competition will continue,” as winning bidders compete for new users and all bidders compete for existing users.²³ Indeed, as discussed below, it is the various tiers proposals that pose the greatest threat to competition in the IP CTS marketplace, not a competitively neutral, market-based auction.

II. While the Commission Should Adopt Market-Based/Mimicking Rates for IP CTS, If It Instead Sets Rates Based on Allowable Costs, It Must Adopt a Uniform Rate, Because There Is No Justification for Tiered Rates for IP CTS.

In the *Further Notice*, the Commission proposes setting permanent IP CTS rates based on providers’ allowable costs.²⁴ While the Commission should not do so—and instead should maintain market-based or market-mimicking pricing through a price cap, followed by a reverse auction—in *no event* should it adopt tiered rates that are purportedly based on providers’ different scales.²⁵ As Professors Skrzypacz and Rosston explain, tiered rates would frustrate the Commission’s goals for the TRS program, would be hopelessly arbitrary (and would arbitrarily have a regulatory scheme pick winners and losers) unless the Commission performs its own analysis of costs and cost curve(s), and would ignore critical distinctions between the IP CTS and VRS markets.

²¹ *Id.* at 39.

²² *Id.* at 40.

²³ *Id.* at 40.

²⁴ See *In re Misuse of Internet Protocol (IP) Captioned Telephone Service*, Report and Order, Declaratory Ruling, Further Notice of Proposed Rulemaking, and Notice of Inquiry, 33 FCC Rcd 5800, 5836-37 ¶ 70 (2018) (“*Further Notice*”).

²⁵ See *id.* at 5843-44 ¶¶ 88-90 (requesting comment on tiers proposals).

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A. Tiered Rates Would Cause Multiple Harms that Are Inconsistent with the Commission's and the ADA's Goals for the IP CTS Program.

CaptionCall supports the Commission's goal of modernizing the IP CTS program to ensure it remains sustainable for the growing population of individuals with hearing loss who rely on captions to communicate effectively by telephone. To achieve its goals, the Commission must set rates that support the delivery of functionally equivalent service; promote efficiency and innovation but reduce waste; and encourage competition and discourage regulatory arbitrage. As the Free State Foundation explains, consistent with these goals, the Commission "should not allow tier-based rates that compensate different providers differentially, regardless of their size or the technology used to provide the service."²⁶ Professors Skrzypacz and Rosston agree. Their report documents that tiered rates would frustrate the Commission's goals for the IP CTS program in numerous ways.

First, tiered rates would reward inefficiency and ultimately could lead to higher costs to the TRS Fund.²⁷ As Professors Skrzypacz and Rosston describe, tiered rates "blunt the incentives for small firms to grow," because "if the marginal rate at the efficient scale is below the average rate, . . . firms have lower incentives to reach the efficient scale under tiers than under a simple uniform rate."²⁸ "Tiered rates also reduce the incentives" for providers to "make investments that reduce unit costs," because if the result would be to grow into the next tier, the "marginal return to such investment would be greatly reduced."²⁹ And on a market-wide basis, tiers create incentives for market share to "change in the direction of smaller providers who are reimbursed at the higher rate, increasing total payments from the TRS Fund."³⁰ "[U]nder the tiered rate, the large providers have less incentives to add customers" than under a uniform rate and the smaller providers "have stronger incentives to add customers" until they hit the tier threshold.³¹

²⁶ *FSF Perspectives* at 3.

²⁷ See Skrzypacz and Rosston Report at 10-12; see also First Brattle Report at 38 ("A tiered structure not only tolerates, but in fact promotes and subsidizes inefficiency."); *FSF Perspectives* at 4 ("[A] tiered rate structure reduces the incentives for high-cost . . . providers to find ways to innovate and be more efficient . . . regardless whether the service provider is smaller than average or has recently entered the market.").

²⁸ Skrzypacz and Rosston Report at 11.

²⁹ *Id.* at 11-12.

³⁰ *Id.* at 13.

³¹ *Id.* at 13; see also First Brattle Report at 38-39 ("[S]ubsidizing providers is unlikely to result in a reduced burden on the TRS Fund. Indeed, the opposite is likely true. Subsidizing perpetually inefficient providers will increase average costs.").

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Second, tiered rates have the potential to harm competition in an otherwise healthy market. “Under the tiered-rate proposals, providers that are less attractive to consumers, even over a sustained time period, would be rewarded by the FCC with higher rates.”³² Moreover, under a uniform rate structure, efficient providers have stronger incentives to invest and compete than under tiered rates, because they are rewarded with the same margin for every customer as their competitors.³³ “[R]ational providers considering improvements of quality . . . compare the marginal cost of those improvements to the marginal profit they can get,” and the “marginal profit depends on the rate the provider gets for additional minutes over its current business.”³⁴ Tiered rates reduce the reward for achieving service quality improvements, thereby dampening competition and harming consumers.

Third, the adoption of tiered rates could cause providers to engage in regulatory arbitrage by, for example, switching to wholesale business models to avoid rate reductions for minutes above tier thresholds. Professors Skrzypacz and Rosston describe that in a tiered rate system, two providers (a wholesaler and a retailer) that are “economically very similar” in terms of minutes of IP CTS provided could receive very different compensation: For example, a “wholesaler working with two small clients would result in double subsidies” (*i.e.*, the higher rate paid to both of the two small providers), while the retail provider would receive reduced compensation for its minutes above the tier cut off.³⁵ Tiered rates thus “create incentives for more providers to use [the wholesale] model,” attracting “new, small retailers who would operate with the wholesaler’s scale but still obtain the subsidy for small-scale providers,” increasing the costs to the TRS Fund and reducing efficiency “by proliferating the number of retail providers without any economic rationale.”³⁶

B. If the FCC Adopts Tiers—Which It Should Not—It Must Do So Based on Its Own Impartial, Expert Analysis of Costs and the Market’s Cost Curve(s), Because Proposals Currently on the Record Are Self-Serving.

Even if the Commission determines that tiers are appropriate for the IP CTS market—which they are not—it lacks the data it needs to set tiers that would have any hope of achieving the Commission’s goals for the program.

³² Skrzypacz and Rosston Report at 10.

³³ *Id.*

³⁴ *Id.*

³⁵ *Id.* at 15.

³⁶ *Id.*

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INFORMATION] in new costs to the TRS Fund.⁴³ The arbitrary and self-serving nature of these rates is further underscored by the fact that they are not based on any new economic data, and the rates were chosen to reach a blended average of \$1.58 per minute, rather than to reflect providers' costs or to reflect marketplace cost curve(s).⁴⁴

ClearCaptions: This proposal is similarly designed to advantage ClearCaptions at the expense of all other providers. Using the same minutes, these rates would result in a **[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]** subsidy to ClearCaptions, with **[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]**.⁴⁵ Additionally, based on ClearCaptions' reported costs to Rolka Loube, these tiers appear to be specifically designed to create a subsidy roughly covering **[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]**.⁴⁶

InnoCaption: The difference in cut-offs between InnoCaption's and ClearCaptions' tiers proposals **[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]**.⁴⁷ And as Professors Skrzypacz and Rosston explain, "Comparing it to the other two proposals, InnoCaption's proposal results in a higher subsidy for InnoCaption than the other two proposals," and it results in "much lower subsidies for the other providers," with CaptionCall still incurring a **[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]** tax. And while InnoCaption states that its tiers are based on its own analysis of its cost curve, it does not explain why its cost curve can be extrapolated to the rest of the market. Indeed, it cannot, given InnoCaption's unique and exclusive focus on mobile users, and its different business model of generating captions through stenography rather than revoicing.⁴⁸

⁴³ *Id.* at 22-23.

⁴⁴ *Id.* at 24-25.

⁴⁵ *Id.* at 26.

⁴⁶ *Id.* at 27.

⁴⁷ *Id.* at 28-29.

⁴⁸ *Id.* at 29-30.

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In short, if the Commission decides that it will adopt tiers, to avoid an arbitrary outcome, it must first collect and independently analyze the relevant data regarding providers' costs (including costs the Commission might prefer to disallow) as they grew to their respective scales. Otherwise it is simply engaging in ad hoc and arbitrary subsidies for its favored providers.

C. The Record Confirms that Differences Between IP CTS and VRS Make Tiers Fundamentally Inappropriate for the IP CTS Market.

The use of tiers for VRS does not provide any basis for their adoption in IP CTS. As CaptionCall has previously explained, the markets for VRS and IP CTS are very different in critical respects,⁴⁹ so importing a rates model from one market to the other without taking account of those differences would be arbitrary. No one in this proceeding has yet identified any “unique factors . . . in the IP CTS market that would make a tiered rate structure more appropriate than averaged compensation rates.”⁵⁰ And in their report, Professors Skrzypacz and Rosston unpack the most salient differences between the two markets that would make tiers particularly problematic for the IP CTS program.

First, there is no indication of scale economies in IP CTS. The only cost data on the record come from Rolka Loube—which are incomplete and show effectively no correlation between scale and costs⁵¹—and the only proposals on the record come from providers, who have each tried to tilt the playing field in its own favor.⁵²

Second, the IP CTS market has a more balanced market structure than the VRS market. There are currently five IP CTS providers with a narrower spread among providers' shares than in VRS, and the largest provider is itself a relatively new entrant.⁵³ Thus, there is no need for the Commission to subsidize entry or competition. Moreover, as discussed above, if there ever is

⁴⁹ CaptionCall Comments at 79-81. CaptionCall does not believe tiers were appropriate for VRS; however, even if they were, as explained herein, that would not justify their adoption for IP CTS.

⁵⁰ *Further Notice*, 33 FCC Rcd at 5844 ¶ 89.

⁵¹ See Skrzypacz and Rosston Report at 18; Declaration of Michelle Connolly at App. A, tbls. 2 & 3 (Sept. 17, 2018) (“Connolly Decl.”), appendix C CaptionCall Comments; see also *supra* notes 37-40 and accompanying text.

⁵² See *supra* notes 42-48 and accompanying text. In VRS, the Commission specifically requested “comment on the shape of the cost curve in the VRS industry (*i.e.*, how a provider's cost per user varies with its number of users), the number of users at which minimum efficient scale is achieved, and the actual and potential size of the VRS market.” *In re Structure and Practices of the Video Relay Service Program*, Further Notice of Proposed Rulemaking, 26 FCC Rcd 17,367, 17,457-58 App. C, ¶ 12 (2011).

⁵³ Skrzypacz and Rosston Report at 17-18; see also Connolly Decl App. A, ¶¶ 15-16.

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such a need, it can be accomplished through short-lived and targeted subsidies incorporated into the Auction Proposal.

Third, entry has been and is much easier in the IP CTS market than in the VRS market. VRS is a mature service with an established base of users; it has had relatively flat demand for years.⁵⁴ In contrast, IP CTS demand has grown rapidly and substantially in recent years⁵⁵—and this trend will continue as the Baby Boom generation ages into hearing loss.⁵⁶ Thus, a smaller or emergent provider can grow market share with new users (without incurring costs to switch users from incumbent providers).⁵⁷ Similarly, the provision of VRS requires employing a skilled labor force of interpreters who have expertise in American Sign Language, whereas IP CTS communications assistants do not require the same specialized skills.⁵⁸ Professors Skrzypacz and Rosston also point out that a new IP CTS entrant can “immediately benefit from economies of scale by contracting with [Ultratec],” but no similar option is available in the VRS market.⁵⁹

Finally, the IP CTS market is at the beginning of a major evolution in technology—the transition to ASR-based service—making tiers unnecessary and counterproductive. The Commission should not subsidize new or smaller providers who use traditional business models; doing so would frustrate its goal of modernizing the program. Instead, the Commission should set policy to encourage providers to invest in the transition to ASR. When the technology is ready, it will generate significant savings for the TRS Fund without any need for the introduction of tiered rates.⁶⁰ There were no similar disruptive technologies on the horizon when the Commission adopted tiered rates for the VRS program (nor are there any today).

⁵⁴ Skrzypacz and Rosston Report at 19-20.

⁵⁵ *Id.* at 19-20.

⁵⁶ CaptionCall Reply Comments at 4-5 (summarizing broad agreement that demand for IP CTS will continue to grow for demographic reasons).

⁵⁷ In any event, switching costs are low in this market, because IP CTS is not, and has never been, dependent on interoperability and does not have any history of network effects. CaptionCall Comments at 80.

⁵⁸ Skrzypacz and Rosston Report at 18.

⁵⁹ *Id.* at 19.

⁶⁰ *Id.* at 19-20.

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III. While the Commission Should Not Set Rates Based on Allowable Costs, If It Does, It Must Avoid Distortions and Inequities by Treating Intellectual Property Costs for Providers that Innovate Themselves and for Providers that License IP from Others Equivalently.

In the *Further Notice*, the Commission acknowledges that any reasonable license fee paid by an IP CTS provider to a third party for intellectual property (“IP”) and technologies used to provide the service is an allowable cost.⁶¹ However, without the benefit of a full record, the Commission has suggested a distinction between those providers that license IP from a third party and a vertically integrated provider that has developed its own IP and now pays licensing fees to an affiliate IP holder—allowing recovery of IP licensing costs for the former but not for the latter. Specifically, in the *Further Notice*, the Commission notes that it is “so far unpersuaded” that it should permit CaptionCall to recover the license fees that it pays to an affiliate for use of the IP that CaptionCall developed itself.⁶² However, the Commission has also made clear that it has not “prejudg[ed]” the issue,⁶³ and the *Further Notice* requests comments on whether, in any rate-setting methodology based on allowable costs, CaptionCall’s internal licensing fees associated with its innovation, or the imputed value of its IP, should be allowable.⁶⁴ As set forth below, it should be, as differential treatment of vertically integrated providers from providers that license IP from third parties will result in arbitrary and material distortions that would materially impede optimal innovation in IP CTS.

⁶¹ See *Further Notice*, 33 FCC Rcd at 5839 ¶ 75. By way of background, certain IP CTS providers including Hamilton Relay and Sprint contract with Ultratec, which licenses its IP to these providers. See generally Comments of Ultratec, Inc. and Captel, Inc. on Petition Filed by Sorenson Communications, Inc. and CaptionCall, LLC Regarding Licensing of Internet Protocol Captioned Telephone Service, CG Dockets No. 03-123 & 13-24 (filed Dec. 29, 2014). By contrast, CaptionCall has always been a vertically integrated innovator and provider that has chosen to fund R&D instead of licensing others’ innovations, and has used the IP it has developed in the provision of IP CTS. In 2017, CaptionCall and its affiliate Sorenson Communications both transferred their IP assets to a separate but affiliated entity, Sorenson IP Holdings, LLC. The Company engaged Deloitte Tax LLP (“Deloitte”) to conduct an independent assessment of a reasonable royalty for the IP license. Subsequently, Sorenson IP Holdings entered into a license agreement with CaptionCall’s parent company, which, in turn, entered into a license agreement with CaptionCall.

⁶² See *Further Notice*, 33 FCC Rcd at 5821-22 ¶ 35. The Commission further suggests that such a fee should not be recoverable as a cost, because CaptionCall “is already permitted to recover eligible expenses [it] incurred in developing such [IP].” *Id.* This concern is addressed below.

⁶³ *Id.* at 5821 ¶ 35 n.127.

⁶⁴ *Id.* at 5839-40 ¶ 76.

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A. Differential Treatment of Providers Who Choose to Innovate In-House Rather than Rely on a Third Party Is Fundamentally Unfair and Would Distort the Market and Set Harmful Incentives that Discourage Optimal Innovation.

As CaptionCall has consistently explained, there is no basis to exclude innovation expenses of providers simply because the innovator and provider are affiliates within a single, vertically integrated entity. Indeed, such an exclusion not only would be arbitrary and capricious, but also would distort the market by creating a disincentive for CaptionCall, the most prolific IP CTS innovator, to continue to innovate optimally and efficiently.⁶⁵

As economist Dr. Christopher A. Vellturo makes clear in the attached declaration, differential treatment of vertically integrated providers like CaptionCall from providers that license IP from third parties is not only fundamentally unfair, but will result in arbitrary and material distortions that would have the likely effect of materially impeding efficient and optimal innovation, thus harming consumers. As Dr. Vellturo explains, the distortions will arise because, “while non-vertically-integrated providers will retain the ability to pay potentially unlimited royalties to use third-party innovations, vertically-integrated firms will have [limited] mechanisms by which to earn returns on their innovations commensurate with the value the innovation brings to the market, and will thus have less incentive to innovate optimally.”⁶⁶ In other words, while third-party licensors would be free to collect royalties from licensed providers (who can in turn submit those royalty payments as allowable costs), the regime would place limitations on the return that vertically integrated innovators can earn on their innovative efforts. The compensation for vertically integrated providers would be limited to the one-time cost of R&D incurred, plus the allowed margin in the allowable cost-based rates,⁶⁷ instead of allowing them to earn a return commensurate with the magnitude of the value/benefit conferred by the innovation as reflected in a royalty directly related to the IP’s value in the market. This non-uniform treatment would leave vertically integrated innovators with relatively less incentive to innovate optimally than parties that license their innovations to IP CTS providers.⁶⁸

⁶⁵ See CaptionCall Comments at 88-89; *see also* Connolly Decl. ¶¶ 51-61.

⁶⁶ Declaration of Christopher A. Vellturo, September 19, 2019 (“Vellturo Decl.”) ¶ 12. A copy of the Vellturo Declaration is attached here as Appendix C.

⁶⁷ Dr. Vellturo refers to this as the “allowable cost reimbursement base” or “ACRB” in his declaration.

⁶⁸ Vellturo Decl. ¶ 27.

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Dr. Vellturo provides detailed economic depictions of the distortions that will arise from any non-uniform treatment of IP expenses.⁶⁹ The depictions show how third-party licensors, such as Ultratec, will have the unfettered latitude to negotiate and collect market rate royalties on its IP, which its licensees like Hamilton and Sprint will then be permitted to include in the allowable cost base throughout the proprietary life of the innovation. By contrast, a vertically integrated innovator like CaptionCall will be limited to the one-time inclusion of its allowable R&D expenses (if allowed), rather than the market value of the innovation developed. This non-uniform treatment will lead to an unlevel playing field in IP CTS innovation, with attendant economic distortion in classical competition in innovation among rival firms.⁷⁰

Dr. Vellturo further demonstrates how this distortion would be particularly acute in innovations that generate marginal cost reductions in the provision of IP CTS, because the benefits of an innovation that reduces marginal costs also results in a reduction of rates under an allowed cost-based rate-setting methodology.⁷¹ Finally, Dr. Vellturo demonstrates how tiered rates would magnify these distortions, because providers receive specific compensation rates tied to changes in their own costs (not in overall average industry costs).⁷² For vertically integrated providers, there would be no royalty mechanism by which any of the surplus generated by the innovation remains as a return for the innovator/provider, and, thus, under tiered rates, the incentives for vertically integrated firms to innovate are sharply reduced.⁷³

As Dr. Vellturo demonstrates, these distortions would be particularly problematic here, as CaptionCall is by far the most prolific innovator in the IP CTS market. A careful study of patents shows that Ultratec's IP generation has, in recent years, fallen behind that of other IP CTS innovators, while there has been a sharp acceleration in CaptionCall's innovation.⁷⁴ In fact, CaptionCall's patent issuances have grown at a compound annual growth rate of 44 percent

⁶⁹ *Id.* ¶¶ 29-33; Appendix 2.

⁷⁰ *Id.* ¶¶ 29-33.

⁷¹ *Id.* ¶ 33.

⁷² *Id.* ¶¶ 34-35.

⁷³ By contrast, for the non-vertically integrated IP CTS provider, their costs would decline by the net difference between the marginal cost savings (a cost reduction) and the royalty it pays (a cost increase). Thus, the royalty "effectively migrates out of the regulatory system, and remains as a return to the non-integrated, non-regulated innovator." *Id.* ¶ 34. In essence, this non-differential treatment creates incentives for opportunistic setting of artificially high royalties that can be used to subvert the passing of "net" cost savings into a lower compensation rate. *Id.* ¶¶ 34-35. *See also* CaptionCall Comments at 88-89.

⁷⁴ Vellturo Decl. ¶¶ 36-37.

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based on utility patents,⁷⁵ and account for the vast majority of the recent innovation activity in the industry.⁷⁶ Moreover, CaptionCall has seventeen IP CTS-related patent applications published over the last four years and another twenty patent applications that are currently under review.⁷⁷ CaptionCall's patents include innovations that improve the overall quality of the TRS service and also keep down the overall size of the Fund, thereby advancing the Commission's goals.⁷⁸ The Commission's proposed differential treatment of IP costs among providers risks handcuffing the most prolific IP CTS innovator, thus working directly against a central goal for the IP CTS program. Indeed, other stakeholders agree that IP-licensing fees should be treated uniformly across providers. The Interstate TRS Advisory Council Cost Analysis subcommittee has concluded that CaptionCall's "[IP] costs should be treated in the same way that other Providers pay a 'license' fee to process their call or pay a third party a significantly higher per minute cost to process their calls."⁷⁹ Hamilton has likewise stated that it would be "improper" to exclude CaptionCall's IP-license fees when establishing provider cost averages for rate-setting purposes.⁸⁰

B. The Commission Can Adopt a Framework to Ensure Fair and Equitable Treatment of IP Costs Among Providers.

These distorted incentives could be avoided entirely if the Commission adopts a market-based compensation rate for IP CTS that is not tied to allowable costs—such as price-cap based regulation or auction-based provider competition as discussed above. Such rates would be

⁷⁵ Utility patents are patents granted to an entity or individual who invents or discovers any new and useful process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof. *See* U.S. Patent and Trademark Office, Nonprovisional (Utility) Patent Application Filing Guide (Jan. 2014), <https://www.uspto.gov/patents-getting-started/patent-basics/types-patent-applications/nonprovisional-utility-patent#heading-2>.

⁷⁶ Velturo Decl. ¶ 38.

⁷⁷ *Id.* ¶¶ 39-40.

⁷⁸ *Further Notice*, 33 FCC Rcd at 5836-37 ¶ 70; *id.* at 5836, 5845 ¶¶ 69, 94 (seeking to "encourage higher-cost providers to become more efficient"); *see also* CaptionCall Comments at 89-90.

⁷⁹ Rolka letter, at 3.

⁸⁰ Comments of Hamilton Relay, Inc., CG Docket Nos. 13-24, 03-123, at 8 (Sept. 17, 2018). In fact, no one on the record has argued that excluding internal IP costs would advance the Commission's goals. *See* Initial Comments of ClearCaptions, LLC, CG Docket Nos. 13-24, 03-123, at 7 (Sept. 17, 2018) (expressing concern about affiliate party transactions, but agreeing that allowing recovery of third-party licensing fees while disallowing internal R&D costs would deter investment in innovation); *see also* Comments of ITTA – The Voice of America's Broadband Providers, CG Docket Nos. 13-24, 03-123, at 15-16 (Sept. 17, 2018) (arguing IP license fees should be allowable but subject to a "reasonable" cap).

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inherently immune to such distortions, as they would rely upon traditional market forces to determine the level of innovative effort.

However, if the Commission moves to an allowable cost framework, the only way to maintain basic fairness and avoid these distortions is to allow the recovery of IP-licensing fees whether the company is vertically integrated or not, for existing IP and future innovation. Moreover, as Dr. Vellturo explains, under a regulatory framework in which (1) non-vertically integrated innovators charge royalties and their licensees include the direct costs of the license in the form of royalties in their submitted costs, *and* (2) vertically integrated firms are allowed to incorporate imputed royalties for their innovations in their submitted costs, the economic incentives for the indirect reward associated with undertaking R&D in IP CTS would be undistorted from the market-based competitive mechanism of innovation investment.⁸¹ As such, and critically, under this proposed treatment of IP costs, CaptionCall would no longer be seeking to include any R&D expenditures in its allowable costs. Not including R&D as allowable costs should assuage any concern from the Commission that IP costs incurred by CaptionCall are already being captured through reimbursement for R&D.⁸² That said, it is important to underscore that the Commission cannot exclude both R&D costs and IP-licensing fees. Doing so would be contrary to the clear mandate of the Americans with Disabilities Act—namely, that any TRS regulation must encourage the development of improved technology⁸³—and arbitrary and capricious under the Administrative Procedure Act.⁸⁴

Finally, if the Commission moves to an allowable-cost rate-setting methodology, and agrees that *all* IP royalties should be considered allowable, there are numerous mechanisms that the FCC could adopt to assess the amount of royalties being submitted by third party licensees and vertically integrated providers alike.

Indeed, in undertaking a review of the suitability of innovation expenses charged by the innovator to the provider (either internally in a vertically integrated setting, or externally in a

⁸¹ Vellturo Decl. ¶ 48.

⁸² See *Further Notice*, 33 FCC Rcd at 5821-22 ¶ 35. Note that this proposal is forward looking. The Commission has not historically set rates based on submitted costs, but rather, either at levels determined by MARS or a 10 percent annual reduction from the 2017 rates. Although CaptionCall and other IP CTS providers were asked to submit costs, compensation was the same regardless of the R&D costs incurred and reported, and so these costs should not be relied upon for any rate-making or policy-making purpose. In other words, reporting of costs was not a request for compensation, and the Commission accordingly should not take the view that, because certain providers reported R&D costs in the past when those costs did not affect the rates, they should be precluded from submitting licensing fees in the future under a ratemaking methodology that relies on submitted costs.

⁸³ See 47 U.S.C. § 225(d)(2).

⁸⁴ Cf. *Sorenson Commc'ns v. FCC*, 765 F.3d 37, 50-51 (D.C. Cir. 2014).

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non-vertically integrated setting), there are a variety of well-established economic frameworks and accompanying tools available to the Commission. As Dr. Vellturo explains, “the valuation of innovation/intellectual property generally, and the assessment of the [reasonableness of] prices/royalties assigned to intellectual property, is a common problem in many aspects of the economy and manifests itself in at least the following exercises: (1) transfer pricing [studies] in intellectual property management across geographies; (2) determination of fair and reasonable ... royalty structures among standard setting organizations in high-tech areas; (3) ‘fairness’ opinions in the assessment of asset purchase/divestiture value; and (4) the assessment of economic damages in the form of ‘reasonable royalties’ in the context of intellectual property litigation, among others.”⁸⁵

Dr. Vellturo further explains that there are a number of tools within each framework that the Commission could utilize, including the Income Approach, the Market Approach, and the Cost Approach, as well as *The Georgia Pacific Factors*, which combine various economic, financial, and technical indicia that direct the practitioner to identify the economic value of the “footprint of the invention” to be licensed, and the likely outcome of a negotiation between the patentee and the licensee (here an infringer) based on various bargaining conditions and dynamics associated with the two parties.⁸⁶ Any potential challenges with specific valuation methodologies can be worked out, but it would be arbitrary and capricious for the Commission to find that CaptionCall is not entitled to *any* compensation for IP costs, while non-vertically integrated providers are, particularly where CaptionCall has expressed its willingness to not submit its R&D for reimbursement.

To achieve its goal of modernizing the IP CTS program, the Commission should set rates that create or mimic market-based incentives, such as an auction or price cap, for providers to invest in efficiency and innovation. Any allowed cost-based rate-setting methodology would be problematic, but tiered rates are especially so. Each of the tiers proposals on the record would set the wrong incentives, could result in *increased* TRS Fund payments over time, lack any foundation in providers’ cost data or marketplace cost curve(s), and overlook material differences between the IP CTS and VRS market structures. Finally, in any allowed cost-based rate-setting methodology, the Commission must ensure that it does not create disincentives for innovators to successfully develop and deploy IP solely by virtue of their organizational structure. Excluding IP costs from vertically integrated providers could ultimately increase payments from the TRS Fund (by preventing those providers from making further investments in

⁸⁵ Vellturo Decl. ¶ 49; *see also id.* ¶¶ 40-53.

⁸⁶ *Id.* ¶¶ 54-56.

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efficiency) and could harm consumers, and there are well-developed tools to evaluate these IP costs.

CaptionCall stands ready to work with the Commission on any of these issues.

Respectfully submitted,

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Enclosures

APPENDIX A

REVERSE AUCTION PROPOSAL FOR SETTING IP CTS RATES

Professor Andrzej Skrzypacz
Prepared for CaptionCall, LLC
September 17, 2018

I. Executive Summary

- This proposal describes a reverse auction design that the Federal Communications Commission (“FCC”) could use to set an IP CTS rate competitively.
- This design provides incentives for IP CTS providers participating in the auction (“participants”) to submit low bids. It does so by rewarding winning bidders (low bidders) with preferential access to new customers, and by threatening losing bidders (higher bidders) with no – or lower – compensation from the TRS Fund for minutes used by new customers until the next auction cycle.
- The auction proposed is a multi-round descending clock auction with a uniform rate offered to all winning bidders. At least two winners are guaranteed per auction cycle, and more are possible.
- The proposal envisions that the auction will be conducted annually. Although the Commission could opt for a different interval, an interval of less than one year is not recommended.
- The auction starts with a specified rate (the reserve price). As long as two or more bidders place bids at that price, the rate decreases. Participants are not allowed to see which bidders or how many bidders remain. When only one bidder remains, the auction stops. The winning rate is the last price at which at least two bidders were still active.
- All bidders who were still active at prices within x% (*e.g.*, 5%) of the winning rate become winning bidders. Bidders who dropped out at higher prices become losing bidders. In addition, new entrants and small providers that do not participate in the auction may be treated as winning bidders so long as they satisfy applicable quality standards.

- To protect existing customers, all providers (including winning and losing bidders) may continue offering service to their current IP CTS customers at the winning rate. Losing bidders may not add new customers (or at least may not request TRS Fund reimbursement for any new users they add) during the auction cycle. I also discuss alternative, more lenient treatments of losing bidders and the tradeoffs involved.
- The proposed design facilitates new entrants, including those trying new technologies, by allowing them to start offering service at the winning rate at any time in between auctions (subject to certain eligibility criteria).
- I discuss necessary safeguards that the FCC must include in the auction design to assure the stability of the market and the Fund. Among other things, I propose that the new rate should be phased in gradually over time, in four equal quarterly increments. A phase-in approach will provide some measure of stability for both providers and the Fund, and will reduce the risk of losing bidders exiting the market.

II. Introduction and Objectives

CaptionCall, LLC asked me to design a reverse auction that could be used to set IP CTS rates. In designing this proposal, I have followed the following objectives and principles:

- **Economic Incentives for Bidding:** The auction must create economic incentives by rewarding low bidders relative to high bidders.
- **Preserve Quality of Service:** The process must ensure high quality of service. This objective can be accomplished by imposing eligibility criteria so that only service providers that provide quality service would be qualified to participate in the auction.
- **Preserve Consumer Choice and Minimize Transaction Costs for Existing Customers:** To the greatest extent possible, the process should preserve consumer choice, and existing customers should be able to continue using their existing equipment and provider if they so choose. The proposal accomplishes this goal in two ways. First, all providers may continue to serve

their current customers as long as they are willing to be compensated at the competitively-set rate. Second, the design guarantees that at least two current providers (and potentially more) will win the right to add new customers.

- **Stability of Business:** To the greatest extent possible, the auction should promote stability of business plans for existing providers. In particular, IP CTS rates should not fluctuate too quickly (*i.e.*, the rates for existing users should not change drastically in a short time horizon).
- **Stability of the TRS Fund:** Although the auction should allow rates to increase if costs go up, to protect the stability of the Fund, the FCC should be able to put a cap on the reserve price that guarantees that any rate increases are limited.
- **The Possibility of Entry:** The auction-supported IP CTS rate-setting process should not foreclose new providers from entering the market. In particular, new entrants should be permitted to begin offering service between auctions at the current auction rate, so that they have the option to begin seeking reimbursement at the market price without participating in the auction. These protections should apply to new entrants, so long as they can meet minimum quality standards.
- **Administrative Costs:** The design should seek to minimize organizational and administrative burdens for both the FCC and IP CTS service providers.
- **Uniform Price:** To the extent possible, providers offering the same service should be reimbursed at the same rate.

No auction design can perfectly satisfy all of these principles at the same time. For example, the provision of economic incentives to bid aggressively is intrinsically inconsistent with providing full business security to existing providers. The auction design I propose tries to strike a balance among these different objectives, but several parameters could be modified depending on the FCC's objectives and any industry changes that might occur between now and the auction. For example, it may be appropriate to adjust some of these parameters to reflect the most current information.

III. Auction Design Proposal: Reverse Auction for the Rights to Add New Users

Because IP CTS continues to attract many new users, an auction design that offers low bidders preferential access to new users would create a substantial economic incentive to bid aggressively. Here, preferential access would mean that winning bidders would be allowed to add new customers and receive compensation from the TRS Fund for these customers' IP CTS minutes, while the losing bidders would not. Losing bidders could remain in the IP CTS market by continuing to providing service to their existing customers at the auction-determined rate and attempting to win in the next auction cycle.¹

The proposed auction process and preferential access afforded to winning bidders are described in further detail below.

A. Auction Mechanics: Auction Process, Rate and Winner Determination, and Eligibility Criteria

- **Auction Process:** Auction-eligible service providers may participate in a descending clock (reverse) auction that sets the per-minute reimbursement rate for IP CTS until the next auction cycle.²
 - The auction starts at the reserve price set by the FCC (discussed below) and progresses in a series of rounds.
 - At the beginning of each round, the FCC declares a new opening-round rate and asks all still-active bidders if they are willing to provide service at that rate. Those who bid 'yes' remain active and may participate in the next round. Those who bid 'no' become inactive and drop out of the auction.
 - If there are two or more active bidders, the FCC reduces the opening-round rate by a small bid increment (for example, 2 cents or 1%, whichever is lower) and the auction continues to the next round.

¹ I discuss other alternative forms of preferential access below.

² See below for a discussion of potential alternative treatment of small providers or new entrants.

- When fewer than two active bidders remain at the end of a round, the auction ends. The winning rate is the previous-round rate. (If the auction ends in the first round, the winning rate is the reserve price.)
- Between rounds, the auction reporting system informs bidders only about the current bid rate and whether or not the auction is still active. Information about the number of other bidders still active or the identity of those bidders would not be available.
- **Rate and Winner Determination:**
 - As stated above, the **winning rate** will be equal to the rate in the round prior to the round in which the auction closes.
 - For example, in round k , the rate is \$1.75, so in round $k+1$, the rate becomes \$1.73. There are two active bidders at the end of round k , but one of them becomes inactive in round $k+1$. Then the winning rate is \$1.75.
 - All bidders active in the round prior to the closing round are automatically winning bidders (by definition, there will be at least two).
 - Any other bidders who were still active at the end of any round when the rate was within $x\%$ (e.g., 3-8%) of the winning rate also become winning bidders.
 - Continuing the above example, with the \$1.75 winning rate, if $x\%$ is chosen to be 5%, then any bidder active at the end of the round with rate \$1.84 or less ($\approx \1.75×1.05) is also a winning bidder. These winning providers, like the other winning bidders, may add new subscribers and be compensated at the winning rate of \$1.75.
 - Bidders who became inactive at the end of a round in which the rate was more than $x\%$ different from the winning rate are losing bidders.
- **Eligibility Criteria:** Only service providers that have established their ability to offer quality service to a substantial fraction of the market are eligible to bid in the auction. (As explained below, small providers and new entrants

may be allowed to offer service at the winning rate without participating in the auction.)

B. Preferential Access for Winning Bidders (Allowable Reimbursements and Rates for Winning and Losing Bidders)

For the duration of the period for which the auction sets rates, the winning bidders can grow their business without any constraints (other than standard regulatory requirements – for example, with respect to eligibility). They can offer service to new users and be reimbursed by the FCC at the winning rate.

Losing bidders are not allowed to add new customers; or, if they do add new customers, losing bidders may not receive reimbursement from the FCC for the IP CTS minutes provided to those new customers for the duration of the period for which the auction sets rates.³

All providers (auction winners and losers) can continue serving customers who were using their services before the auction at the **winning rate**. (I discuss below a gliding rate approach so that the rate adjusts gradually over time at a rate no higher than 2.5% a quarter.)

Alternative conditions for **smaller providers and new entrants** are discussed below.

C. Further Considerations in Designing the Auction

1. Reserve Prices

To assure that the auction does not result in unexpected cost increases for the TRS Fund, the FCC may impose a reserve price (rate) that is the highest rate it is willing to pay. The descending-price auction would start at that price.

Note that competition among service providers can drive rates temporarily and inefficiently below costs, so that the reserve price should not automatically be set below the prior year's rate. This can happen, for example, if a service provider miscalculates its

³ See discussion below for a possible relaxation of that constraint.

efficiencies of scale and how much it will be able to grow its market share if it wins the auction. If the reserve price is kept inefficiently low, it can result in providers leaving the market, which in turn would create service interruptions. It is therefore important that the process can self-correct in the next auction cycle.

The auction is designed so that competition among bidders results in fair rates reflecting true costs. The reserve prices should be used solely as a safety mechanism, not to artificially constrain the outcome of the auction.

2. Assuring the Stability of Rates – Phasing-in New Rates

In order to provide stability for both the TRS Fund and for service providers, I propose that the new rate should be phased in gradually over time, in four equal quarterly increments.

For example, if the winning rate decreases by 12 cents/minute, a gradual phase-in would be that it would decrease by 3 cents/minute at the beginning of each quarter over four quarters. Similarly, if the rate increases, the increase would be phased-in over four quarters. For example, if the winning rate increases by 8 cents/minute, the rate at which the FCC reimburses providers would be increased by 2 cents/minute at the beginning of each quarter over four quarters.

Such a gradual adjustment approach would provide some insurance to existing providers and to the Fund. It would reduce the risk of losing bidders being driven out of business as the result of one auction with extreme results. They would have some time buffer to reduce costs to remain competitive.⁴

3. Safeguards

Relying on a reverse auction to set rates introduces some degree of uncertainty into the rate-setting process. First, rates may change year-to-year in response to changes in cost

⁴ If the winning rate differs from the previous-auction winning rate by more than 10%, the phase-in period would be extended and any single quarter adjustment would be capped at 2.5%. To reduce the administrative burden of reporting which customers are reimbursed at which rate, the rate for new customers and for existing customers should be phased in using the same approach.

structures. Second, losing bidders may find themselves shut out of the market for new subscribers. Third, the costs to the TRS Fund may fluctuate unexpectedly.

To balance these issues, I recommend implementing the following safeguards:

- Rates should not change in either direction by more than 2.5% a quarter.
- Auctions should take place once a year, or less frequently (for example, every 18 or 24 months). These intervals will allow losing bidders time to reduce their costs and submit more competitive bids in the next auction. (Auctions should not be held more frequently than annually because incentives to bid aggressively decline when auction cycles are more closely spaced; uncertainty of outcomes could be even more significant; and the administrative and practical burdens on both the Commission and bidders would increase).
- Bidders must be pre-qualified to participate in the auction, by showing credible capability and capacity of providing quality service. They should be providing service at some minimum scale, *e.g.*, 2% of the market. They should also demonstrably satisfy a minimum quality standard. Finally, to avoid costly mistakes and disruption of service, in case a provider has less than 5% of the existing subscribers, it should be asked to demonstrate that their bids are not below their costs.⁵
- The FCC should retain the right to cancel the auction if the winning bids and the winning rate would jeopardize the continued provision of the service (for

⁵ While unrealistically-low rates may, at first, seem beneficial to the Fund, they may not result in any long term benefits to the FCC or to IP CTS users. *See, e.g.*, Letter from Scott R. Freiermuth, Counsel for Sprint Corp., to Marlene H. Dortch, Secretary, Federal Communications Commission, CG Docket Nos. 13-24, 13-123 (June 1, 2018) (discussing collapse of IP Relay market due to providers' exiting market after rate decrease); *see generally In re Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Order, 28 FCC Rcd 9219, 9221-245 ¶¶ 10-20 (CGB 2013); *In re Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Order, 29 FCC Rcd 16,273 (CGB 2014). New service providers that bid unrealistically low could later decide not to offer any service. That may result in service interruptions, lack of new service options, or both. A particularly dangerous scenario would be if two new entrants were to submit unrealistically low bids with no intention to offer service, but instead intending to disrupt the market. For example, new entrants may hope to unfairly reduce competition by offering vastly inferior competing service and disrupting the IP CTS market.

example if the winning rate is unsustainably low) or the sustainability of the Fund (or for any other unforeseen reason).

4. Necessary Data Collection

The reverse auction would require all providers to submit a list of subscriber phone numbers on an annual basis (or each auction cycle). For privacy reasons, these lists could be submitted without disclosing actual names or addresses. All providers would be required to submit this data before the auction to enable the FCC to determine the set of reimbursable minutes for the losing bidders.

5. Information Reporting during the Auction

The auction system would keep confidential the number of active bidders that remain in each round. Were information about other auction participants available, it would create a high risk that the second-lowest bidder would strategically drop out as soon as it learns that only two bidders remain. That, in turn, would provide little incentive for the third-lowest bidder to bid aggressively (because that bidder would reasonably expect that the auction will stop as soon as it becomes inactive). Not knowing how many other bidders are still active and how low the rate may go, a bidder will face a severe risk of being shut out from the market for new customers if it drops out too soon, at a bid price significantly above its per-minute costs.

After the auction ends the winning rate and the set of winning bidders would become public. All other bid data should remain private (not to affect bidding in the next auction).

6. Alternative Treatment of Losing Bidders

The auction I describe above is based on offering the winning bidders significant preferential access to new users: Losing bidders are not allowed to add any new subscribers (or, more precisely, to be reimbursed for any minutes provided to new subscribers) during the auction cycle.

While the risk of being shut out should create powerful incentives for aggressive bidding, it could also produce high costs for losing bidders if it required them to shut down their marketing and outreach until the next auction cycle.

An alternative solution would be to allow the losing bidders to continue adding new users but only at a lower rate than the winning bidders (for example, the FCC could compensate losing bidders at 80% of the winning rate). Although that reduced rate may be below losing providers' average costs, it may nonetheless be higher than the marginal cost if one takes into account the costs of closing the outreach organization for a year and later having to re-build it.

A provision of that kind would provide an additional safeguard for the IP CTS providers. Even if they are not winning bidders in the auction, the lower rate would apply only to new customers; and existing customers would still be reimbursed at the winning rate. As an additional safeguard, the FCC could consider imposing the lower rate for only one year from the time the new customer starts using the service (even if the auction cycle is longer than a year).⁶

The tradeoff in choosing the level of preferential access for the winning bidders (and hence treating the losing bidders more or less leniently) is that more lenient treatment of losing bidders results in weaker incentives for participants to bid aggressively in the auction. On the other hand, a strict rule against losing bidders adding new subscribers may create an unnecessary administrative burden on both service providers and the FCC and lead to inefficient management of providers' outreach and marketing operations.

7. Small Providers and New Entrants

Small providers (for example, those with less than 2% of prior-year minutes) and new entrants may lack the capacity to serve a large enough fraction of the flow of new

⁶ A different solution would be to allow losing bidders to add some new customers at the winning rate, but with a binding constraint on the number related to the past-year number of added subscribers and the expected overall growth of subscribers. That solution would have similar tradeoffs as the lower-than-market rate solution.

customers to participate in the auction. These providers may also lack the expertise to participate in the auction or may find such participation too costly.

In order to protect the opportunities for market entry, the FCC may offer such new entrants and small providers the option of being treated as a winning bidder without participating in the auction. This accommodation would promote new entry and experimentation in the provision of new services. This option may be attractive to providers that find it hard to estimate the costs of providing the service at scale and may prefer to offer service at the “market rate.” Moreover, such a provision would also allow new entry between auctions (*i.e.*, even if the auctions set prices July-June, this would allow new entrants to enter in January, for example). Finally, the FCC may choose to offer this provision to small providers only for a limited time.

To the extent that the FCC wants to further accommodate new entrants and small providers, it could extend this option further. For instance, the option of being treated as a winning bidder without participating in the auction could be available to new entrants for a set amount of time (for example, for two years per provider, even if the provider grows above the 2% threshold in that time).

The FCC must maintain safeguards to encourage responsible entry of providers that can deliver service above the minimum acceptable quality. In particular, the pre-qualification criteria for existing service providers seeking compensation from the Fund should apply equally to providers that opt to be treated as winning bidders without participating in the auction.

8. Frequency of Auctions

The above proposal assumes that the FCC will conduct auctions annually to determine rates and identify winning and losing bidders (as well as the preferential access winning bidders receive) for the next twelve months. In the alternative, the FCC could hold auctions less frequently (for example, at 18- or 24-month intervals). On the one hand, more frequent auctions would allow losing bidders to adjust their business and “get back in the game” sooner. On the other hand, less frequent auctions would reduce the administrative burden for the bidders and the FCC, and afford losing bidders time to

make meaningful changes. Again, an auction period of less than one year is not recommended. In addition to increasing administrative burdens, more frequent auctions could negatively impact the stability of providers' business and the predictability of Fund compensation.

IV. Conclusions

A reverse auction provides a workable method to determine the market-based IP CTS rates. Because IP CTS is currently being delivered by multiple providers, a well-structured auction can provide incentives for aggressive bidding and at the same time maintain sufficient continuity of business and consumer choice. An auction of this kind would offer stronger incentives for process and product innovation than would methods based on submitted costs. And, in the long run, an auction-based process is likely to result in better service at lower cost to the Fund and the public than would a methodology based on submitted costs.

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Research

Published and Accepted Papers

1. Ivan Marinovic, Andrzej Skrzypacz and Felipe Varas (2017) “Dynamic Certification and Reputation for Quality.” Forthcoming in *American Economic Journal: Microeconomics*.
2. Jonathan Levin and Andrzej Skrzypacz (2016) “Properties of the Combinatorial Clock Auction.” *American Economic Review* 106(9) 2528-2551.
Reprinted in Bichler, Martin, and Jacob K. Goeree, eds. *Handbook of Spectrum Auction Design*. Cambridge University Press, 2017.
3. William Fuchs, Aniko Öry and Andrzej Skrzypacz (2016) “Transparency and Distressed Sales under Asymmetric Information.” *Theoretical Economics* 11(3) 1103–1144.
4. Johannes Hörner and Andrzej Skrzypacz (2016) “Selling Information.” *Journal of Political Economy* 124(6) 1515-1562.
5. Simon Board and Andrzej Skrzypacz (2016) “Revenue Management with Forward-Looking Buyers.” *Journal of Political Economy* 124(4) 1046-1087.
6. William Fuchs, and Andrzej Skrzypacz (2015) “Government Interventions in a Dynamic Market with Adverse Selection.” *Journal of Economic Theory* 158, pp. 371-406.
7. Andrzej Skrzypacz and Juuso Toikka (2015) “Mechanisms for Repeated Trade.” *American Economic Journal: Microeconomics*, 7(4), pp. 252-93.
8. Christopher Phelan and Andrzej Skrzypacz (2015) “Recall and Private Monitoring.” *Games and Economic Behavior* 90 (March), pp. 162–17.
9. Maria Bigoni, Marco Casari and Giancarlo Spagnolo and Andrzej Skrzypacz (2015) “Time Horizon and Cooperation in Continuous Time.” *Econometrica*, 83(2), pp. 587-616.
10. Matthew Mitchell and Andrzej Skrzypacz (2015) “A Theory of Market Pioneers, Dynamic Capabilities and Industry Evolution.” *Management Science* 61(7), pp.1598-1614.
11. Ilan Guttman, Ilan Kremer and Andrzej Skrzypacz (2014) “Not Only What but also When - A Theory of Dynamic Voluntary Disclosure.” *American Economic Review* 104(8), pp. 2400-2420.
12. Qingmin Liu and Andrzej Skrzypacz (2014) “Limited Records and Reputation Bubbles.” *Journal of Economic Theory* 151, pp. 2-29.

13. T. Renee Bowen, David M. Kreps and Andrzej Skrzypacz (2013) "Rules With Discretion and Local Information." *Quarterly Journal of Economics* 128(3), pp. 1273-1320.
14. William Fuchs and Andrzej Skrzypacz (2013). "Bargaining with Deadlines and Private Information." *AEJ: Microeconomics*, 5(4), pp. 219-43.
15. Andrzej Skrzypacz (2013) "Auctions with Contingent Payments – an Overview." *International Journal of Industrial Organization* 31(5), pp. 666-675 (Special Issue: Selected Papers, European Association for Research in Industrial Economics 39th Annual Conference, Rome, Italy, September 2-4, 2012)
16. William Fuchs and Andrzej Skrzypacz (2013) "Bridging the Gap: Bargaining with Interdependent Values" *Journal of Economic Theory*, 148(3), pp.1226–1236.
17. Patrick Jordan, Uri Nadav, Kunal Punera, Andrzej Skrzypacz and George Varghese (2012) "Lattice Games and the Economics of Aggregators." Proceedings of the 21st International World Wide Web (WWW 2012).
18. Christopher Phelan and Andrzej Skrzypacz (2012) "Beliefs and Private Monitoring." *Review of Economic Studies*, 79(4), pp. 1637-1660.
19. Peter Cramton, Evan Kwerel, Gregory Rosston and Andrzej Skrzypacz (2011) "Using Spectrum Auctions to Enhance Competition in Wireless Services." *Journal of Law and Economics* 54(4), pp.167-188.
20. Joseph E. Harrington, Jr. and Andrzej Skrzypacz (2011) "Private Monitoring and Communication in Cartels: Explaining Recent Collusive Practices." *American Economic Review* 101(6), pp. 2425–49.
21. Yuliy Sannikov and Andrzej Skrzypacz (2010) "The role of Information in Repeated Games with Frequent Actions." *Econometrica*, 78 (3), pp. 847–882.
22. William Fuchs and Andrzej Skrzypacz (2010) "Bargaining with Arrival of New Traders." *American Economic Review* 100(3), pp. 802–36.
23. Yuliy Sannikov and Andrzej Skrzypacz (2007) "Impossibility of Collusion under Imperfect Monitoring with Flexible Production." *American Economic Review*, 97(5) pp. 1794–1823.
24. Joseph E. Harrington, Jr. and Andrzej Skrzypacz (2007) "Collusion under Monitoring of Sales." *Rand Journal of Economics*, 38 (2) pp. 314 - 331.

25. Ilan Kremer and Andrzej Skrzypacz (2007) "Dynamic Signaling and Market Breakdown." *Journal of Economic Theory*, 133 (1) pp. 58-82.
26. Matthew Mitchell and Andrzej Skrzypacz (2006) "Network Externalities and Long-Run Market Shares." *Economic Theory* 29 (3) pp. 621-648.
27. Yossi Feinberg and Andrzej Skrzypacz (2005) "Uncertainty about Uncertainty and Delay in Bargaining." *Econometrica* 73 (1) pp. 69-91.
28. Peter DeMarzo, Ilan Kremer and Andrzej Skrzypacz (2005) "Bidding with Securities: Auctions and Security Design." *American Economic Review* 95 (4), pp. 936-959.
29. Jerzy Konieczny and Andrzej Skrzypacz (2005) "Inflation and Price Setting in a Natural Experiment." *Journal of Monetary Economics* 52(3), pp. 621-632.
30. Andrzej Skrzypacz and Hugo Hopenhayn (2004) "Tacit Collusion in Repeated Auctions." *Journal of Economic Theory* 114 (1), pp. 153-169. (One of the 20 Most Cited articles 2004-2008 published in JET).

Working Papers and Work in Progress

31. Yuliy Sannikov and Andrzej Skrzypacz (2017) "Dynamic Trading: Price Inertia and Front-Running." Stanford GSB working paper No. 3487. (R&R in American Economic Review)
32. Felipe Varas, Ivan Marinovic and Andrzej Skrzypacz and (2017) "Random Inspections and Annual Reviews: Optimal Dynamic Monitoring."
33. Dmitry Orlov, Andrzej Skrzypacz and Pavel Zryumov (2018) "Persuading the Regulator To Wait." Stanford GSB Working Paper No. 3406. (R&R in Journal of Political Economy)
34. Peter DeMarzo, Ilan Kremer and Andrzej Skrzypacz (2017) "Test Design and Minimum Standards." (R&R in American Economic Review)
35. Dmitry Orlov, Pavel Zryumov and Andrzej Skrzypacz (2017) "Design of Macro-Prudential Stress Tests."
36. William Fuchs and Andrzej Skrzypacz (2017) "Timing Design in the Market for Lemons." (R&R in Review of Economic Dynamics)

Chapters in Books

37. April Franco, Matthew Mitchell, and Andrzej Skrzypacz (2017) "An Economic Theory of Dynamic Capabilities." In "Oxford Handbook on Dynamic Capabilities" Editors: Sunyoung Lee and David J. Teece.
38. Johannes Hörner and Andrzej Skrzypacz (2017) "Learning, Experimentation, and Information Design." In B. Honoré, A. Pakes, M. Piazzesi, & L. Samuelson (Eds.), *Advances in Economics and Econometrics: Eleventh World Congress (Econometric Society Monographs*, pp. 63-98). Cambridge: Cambridge University Press.

Earlier working papers:

39. Ilan Kremer and Andrzej Skrzypacz (2006) "Information Aggregation and the Information Content of Order Statistics."
40. Jerzy Konieczny and Andrzej Skrzypacz (2006) "Search, Costly Price Adjustment and the Frequency of Price Changes – Theory and Evidence."
41. Matthew Mitchell and Andrzej Skrzypacz (2006) "Market Structure and the Direction of Technological Change."
42. Ilan Kremer and Andrzej Skrzypacz (2004). "Auction Selection by an Informed Seller."
43. Andrzej Skrzypacz (2004) "Bargaining under Asymmetric Information and the Hold-up Problem."

Main Non-Refereed Articles, Policy Briefs and Opinion Pieces

44. Gregory Rosston and Andrzej Skrzypacz "- Using Auctions and Flexible-Use Licenses to Maximize the Social Benefits from Spectrum." Submitted to the FCC in September 2017 and prepared on behalf of T-Mobile.
45. Susan Athey and Andrzej Skrzypacz (2017). "Yuliy Sannikov: Winner of the 2016 Clark Medal." *Journal of Economic Perspectives*, 31(2): 237-56.
46. Gregory Rosston and Andrzej Skrzypacz "Moving from Broadcast Television to Mobile Broadband: The FCC's 2016 Incentive Auction," SIEPR Policy Brief, January 2016.
47. Gregory Rosston, and Andrzej Skrzypacz "A Dynamic Market Rule for the Broadcast Incentive Auction: Ensuring Spectrum Limits Do Not Reduce Spectrum Clearance." Submitted to the FCC and prepared for T-Mobile.
48. Paul Milgrom, Gregory Rosston, and Andrzej Skrzypacz "Using Procurement Auctions to Allocate Broadband Stimulus Grants." SIEPR Policy Brief, May 2009.
49. "Comments of 71 Concerned Economists: Using Procurement Auctions to Allocate Broadband Stimulus Grants," organized by Paul Milgrom, Gregory Rosston, Andrzej Skrzypacz, and Scott Wallsten, submitted to NTIA April 13 2009.
50. Andrzej Skrzypacz "Economic Analysis of the Provision Of Roaming Services in the Wireless Service Industry," filed Nov. 30, 2009 at the FCC prepared for T-Mobile.

51. Gregory Rosston and Andrzej Skrzypacz “The FCC’s 700 MHz Auction.” SIEPR Policy Brief , December 2007
52. Peter Cramton, Andrzej Skrzypacz and Robert Wilson “The 700 MHz Spectrum Auction: An Opportunity to Protect Competition In a Consolidating Industry,” submitted to the U.S. Department of Justice, Antitrust Division, 13 November 2007 and prepared for Frontline Wireless, LLC .
53. Peter Cramton, Gregory Rosston, Andrzej Skrzypacz and Robert Wilson “Comments on the FCC’s Proposed Competitive Bidding Procedures for Auction 73,” 31 August 2007 and prepared for Frontline Wireless, LLC.
54. Peter Cramton, Andrzej Skrzypacz and Robert Wilson “Revenues in the 700 MHz Spectrum Auction” Working Paper, University of Maryland, 27 June 2007 and prepared for Frontline Wireless, LLC.

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APPENDIX B

Methodology for setting IP CTS rates

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Prepared for CaptionCall, LLC
September 19, 2019

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I. Introduction

A. Summary

This report explains why the Federal Communications Commission (“Commission” or “FCC”) should adopt a rate methodology that produces a single uniform rate applied to all providers of IP CTS, for example generated through a uniform price cap methodology followed by a competitive auction such as the CaptionCall Auction Proposal. Proponents of tiered rates have not shown that tiered rates provide any benefit to consumers and there is no economic evidence demonstrating the economies of scale that would be necessary (but not sufficient) for consideration of a set of tiered rates. Tiered rates would frustrate the goal of providing functionally equivalent service in an efficient manner and would increase rather than decrease costs to the Telecommunications Relay Services (“TRS”) Fund.

While the Commission has adopted tiered rates for Video Relay Services (“VRS”), we explain economic differences in the two services and markets that support the conclusion that tiered rates would be especially harmful to efficiency in the IP CTS market. Entry has been successful in IP CTS without tiered rates, IP CTS has greater potential growth so that entrants can gain customers without the costs of switching them from other providers, there is a much different labor force to supply IP CTS, and, in the future, there is potential entry of new technology that could substantially improve the efficiency of service delivery.

Finally, we show that each of the tiered-rate proposals advocated by other providers would disproportionately benefit that provider. The Brattle Group, retained by Hamilton, predicted such self-interest and it is not surprising.

In addition, we explain that all of the criticisms of the Auction Proposal simply misunderstand how the proposal works. To make sure that it does not distort the marketplace for IP CTS and frustrate efficiency, the Commission should adopt competitively neutral rates through the Auction Proposal, or at least set a single rate that applies equally to all firms (possibly with a limited-time higher rate for new entrants if five incumbent providers are, for some reason, deemed insufficient).

B. Qualifications

I, Gregory Rosston, am the Gordon Cain Senior Fellow at the Stanford Institute for Economic Policy Research (“SIEPR”) and Director of the Public Policy program and Professor (by courtesy) in the Economics Department at Stanford University. I received my Ph.D. and my M.A. in economics from Stanford University and my A.B. with Honors in economics from the University of California, Berkeley. My specialties include industrial organization, antitrust and regulation with an emphasis on telecommunications. I served at the FCC for three and one-half years as Deputy Chief Economist, as Acting Chief Economist of the Common Carrier Bureau and as a senior economist in the Office of Plans and Policy. In addition, I spent six months as Senior Economist for Transactions at the FCC evaluating the proposed merger of AT&T and T-Mobile. In these positions, I had significant involvement with, among other things, the FCC’s implementation of areas of competition policy.

I, Andrzej Skrzypacz, am the Theodore J. Kreps Professor of Economics at the Stanford University Graduate School of Business, and I am Professor of Economics by courtesy, at the School of Humanities and Sciences at Stanford University. I received my

Ph.D. and my M.A. in economics from the University of Rochester and my B.S. and M.A. in economics from the Warsaw School of Economics. My specialties include industrial organization, game theory, strategy, and market design. Between 2011 and 2014 I served as co-editor of the American Economic Review. I am also an associate editor at the Rand Journal of Economics (since 2008) and a board editor for the American Economic Review: Insights (since 2017). I have also served as associate editor at Theoretical Economics. I am a Co-Director of the Executive Program in Strategy and Organization at Stanford. I am a fellow of the Econometric Society, Economic Theory Fellow at the Society for the Advancement of Economic Theory and Senior Fellow of the Rimini Centre for Economic Analysis.

We have studied the economics of the IP CTS industry by researching the operation of the industry, reviewing FCC reports and data, and discussing business operations and the marketplace with CaptionCall and with its legal counsel. Our curriculum vitae are attached as Exhibit 1.

II. Negative Economic Consequences of Tiered-rates Structures

Several providers advocate for tiered rates for the IP CTS market. As we explain below, the FCC should not use tiered rates to reimburse IP CTS providers. Tiers would hamper rather than promote the FCC's policy objectives. Tiers would likely subsidize inefficient providers leading to higher program costs and weaker incentives for innovation. We discuss below the specific flaws of some of the proposals submitted by other IP CTS providers, but first show generally that tiered-rate structures would be problematic. Some of our reasoning is similar to opinions in Hamilton's white paper by

Coleman Bazelon and Brent Lutes (the “First Brattle Report”) in which they state:

“Indeed, economic reasoning indicates that a tiered-rate structure is likely to be inefficient and ineffective.”¹

Moreover, it is our understanding that the Commission does not have good data or evidence in the record about potential economies of scale in the provision of IP CTS, or even costs more generally. The cost data collected so far by the FCC and reported by the TRS Fund administrator, Rolka Loube, is inconsistent across providers, is only a snapshot at a few points in time, and does not measure fixed and variable costs in a way necessary to understand or measure economies of scale. Tiers in general blunt beneficial economic incentives. Implementing tiered rates without sufficient information about the underlying costs is particularly problematic.

A. *FCC goals*

We understand the statute directs the FCC to ensure that TRS, including IP CTS, are provided in a manner that is functionally equivalent to services available to hearing individuals, and to ensure that TRS are made available to the extent possible, and in the most efficient manner.² We also understand the statute directs the FCC to ensure that implementing regulations do not discourage or impair the development of improved technology.³

¹ Coleman Bazelon & Brent Lutes, *Economic Considerations of IP CTS Rate Structure and Methodology*, (Mar. 27, 2019) (“First Brattle Report”), exhibit 1 to letter from Brent Lutes, Associate, The Brattle Group to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 10-51, and 03-123 (Mar. 27, 2019), [https://ecfsapi.fcc.gov/file/10327217925757/IP%20CTS%20Rate%20Structure%20\(REDACTED%20-%20FOR%20PUBLIC%20INSPECTION\).pdf](https://ecfsapi.fcc.gov/file/10327217925757/IP%20CTS%20Rate%20Structure%20(REDACTED%20-%20FOR%20PUBLIC%20INSPECTION).pdf).

² 47 U.S.C. § 225(a)(3) and (b)(1).

³ *Id.* § 225(d)(2).

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The FCC must be forward looking to achieve these statutory directives. The FCC needs to recognize how its rates and policies affect current costs and service as well as their evolution in the future. To reduce service costs, the FCC needs to provide economic incentives for providers to seek cost reductions.

The FCC should also worry about potential negative consequences of policy changes that would drive providers out of the market. Exits may be the sign of a healthy and competitive market if lower quality and higher cost firms are driven out. However, provider exits may reduce end user choice and potentially interrupt service. Exit can also lead to higher long-term costs and lower quality of service if the remaining providers, facing less competition, no longer fight for market share.

Note that rational providers (of all products and services in a market economy) make entry/exit decisions based on the net present value (“NPV”) of costs and revenues over many years, not just based on current revenues and costs. For example, a new entrant may have higher costs in the short run but with some experience expect to reduce its costs below its competitors. Such an entrant would make decisions based on the whole stream of expected costs and revenues. If its calculated NPV of returns is positive, it would remain in the market despite short-term losses. In other words, rational service providers base decisions on the expected long-term evolution of costs. To help providers make such efficient decisions it is important for the FCC to commit to multi-year rates and to clearly signal the methodology it will use in the following years.

Contrary to claims by ClearCaptions, the FCC’s objective should not be to minimize provider margins.⁴ A focus on margins could blunt incentives to invest in efficient service. It is also not to maintain some fixed magical number of providers.⁵ Some degree of competition is helpful for achieving the FCC’s goals, but subsidizing inefficient providers to keep many providers in the market is not.

B. Incomplete and inconsistent cost data

If the FCC is going to consider provider costs in setting rates, it must ensure that it has accurate data that is consistent across providers and is useful for addressing the appropriate question. We understand that the Rolka Loubé (“RL”) Report for 2019-2020 has excluded, among other things, reported “Outreach” costs when calculating each provider’s “Revenue Requirement” and “Expenses.”⁶ In addition, it has excluded the

⁴ ClearCaptions explains the alleged benefits of their proposal on Slide 9 of its November 7, 2018 filing, “A multi-tiered rate ... ensures providers only earn reasonable margins, thus preventing providers from overinvesting in growth ...” Letter from Paul C. Besozzi and Peter M. Bean, Counsel for ClearCaptions, to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24 and 03-123, Ex. 1, at 9 (Nov. 7, 2018) (“November 8 Presentation”). Also, ClearCaptions’ July 26, 2019 filing states that a benefit of the four-tier structure is that it “Ensure[s] providers are not earning unreasonable operating margin.” Letter from Russell M. Blau & Tamar E. Finn, Counsel to ClearCaptions, to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24 and 03-123, at 1 (July 26, 2019). If lower operating margins were achieved by allocating more minutes to higher-cost operators, such an objective would be contrary to the goals of the FCC and impose unnecessary burdens on the TRS Fund.

⁵ In its November 8 Presentation ClearCaptions states “A multi-layered structure, however, removes excess growth resources from the dominant provider, provides a sensible profit margin to all players,” November 8 Presentation at 2, seeming to imply that providing profit margins to all providers and removing some undefined “excess growth resources” from the most efficient provider should be the FCC’s objectives.

⁶ See Rolka Loubé Associates, LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, CG Docket Nos. 03-123 and 10-51, Ex. 1-3.1 (Apr. 30, 2019) (“RL Report”). It is our understanding that the outreach costs are currently allowable costs. In its June 2018 FNPRM, the FCC requested comment “on whether [to] . . . allow outreach expenses to be compensable from the TRS Fund as part of an IP CTS provider’s reasonable expenses,” noting that “outreach expenses for IP CTS currently average about \$.05 per minute.” *In re Misuse of Internet Protocol (IP) Captioned Telephone Service*, Report and Order, Declaratory Ruling, Further Notice of Proposed Rulemaking, and Notice of Inquiry, 33 FCC Rcd 5800, 5840 ¶ 79 (2018) (“June FNPRM”). We understand from counsel that implicit in this request for comment is a recognition that “outreach” costs were (and still are) currently considered an allowable cost category for IP CTS reporting purposes. See *id.* at 5837-38 ¶ 72 & Table 2 (identifying “outreach” as a reported cost and requesting comment on placing “caps on allowable costs for outreach and

Intellectual Property (“IP”) licensing costs for CaptionCall. Had those costs been included, the total Revenue Requirement and Expenses for 2019-2020 across all providers would have been higher, at approximately [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] respectively, and the overall firms’ operating margins would have been lower at [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] at the \$1.58/minute rate and [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] at the \$1.75/minute rate.⁷ Moreover, the total (over the five providers) “Profit” reported by RL at the \$1.58/minute rate would be [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] a year. Further, this loss is understated as providers incur additional costs that are not included in these calculations (for example, some of the “profit” goes to the end users in the form of necessary equipment).

While the RL Report summarizes submitted costs for the various providers, it does not provide any evidence or support for tiers being efficient or necessary.

marketing.” (emphasis added)). While the 2018 Order did specifically exclude CPE and affiliate IP licensing costs from its evaluation of the 2018-19 and 2019-20 Fund Year interim rates, *id.* at 5819-22 ¶¶ 33-35, it did not specifically exclude outreach costs.

⁷ We added CaptionCall’s 2019 IP costs to its affiliate as reported to RL as [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] and its outreach costs of [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]. For other providers we have added outreach costs at 3.9 cents per minute, consistent with the projected average outreach cost in RL Report, Exhibit 1-3.

In particular, the data on estimated costs of different suppliers shows that

[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED]

[REDACTED] :END

HIGHLY CONFIDENTIAL INFORMATION], arguing against economies of scale.⁸

While we expect that the IP CTS business has some fixed costs and hence some economies of scale, most of the costs are variable due to the nature of service provision being very labor intensive, so the economies of scale are probably quite limited. It is more likely that most differences in costs are attributable to differences in skills and experience of managing call centers, prior investments in technology and business processes, and/or differences in business models (owned vs. outsourced call centers, smartphone app vs. physical phone, etc.) than to differences in scale. Before simply assuming that scale economies are present and implementing a tiered-rate structure, an investigation of costs should be undertaken to support the underlying foundational assumption.⁹

⁸ RL Report, Exhibit 1-3.1.

⁹ First Brattle Report at 36 (“A Tiered structure in which tiers are based on volume presumes that differences in providers’ costs are driven by production scale. That is, it presumes there is a strong and strictly decreasing relationship between volume and average cost across all providers. Nevertheless, providers’ cost data simply does not support such a presumption.”). ClearCaptions’ expert, Dr. David Salant, makes the same point that evidence is needed: “And the FCC should not base its decision on less than hard evidence about where economies of scale kick in.” Rebuttal Report of David J. Salant ¶ 37 (Oct. 31, 2018) (“Salant Rebuttal Report”), exhibit 2 to letter from Paul C. Besozzi and Peter Bean, Counsel for ClearCaptions, to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 10-51, and 03-123 (Nov. 7, 2018), <https://ecfsapi.fcc.gov/file/1107687114799/2018-11-07%20-%20ClearCaptions%2C%20LLC%20Notice%20of%20Ex%20Parte%20-%20Carr%2C%20Roth%2C%20Litman%2C%20CGB%20-%20REDACTED.pdf>.

C. Damage to competition

An important negative consequence of tiered rates is the potential damage to competition. Under the tiered-rate proposals, providers that are less attractive to consumers, even over a sustained time period, would be rewarded by the FCC with higher rates. In other words, a tiered-rate system is a sustained subsidy for providers that do not manage to attract and serve customers. The tiered-rate subsidy would be financed by the TRS Fund – that is by companies – because of higher overall expenditures and by a transfer from the larger providers that have gained market share by proving themselves more attractive to consumers.

The FCC should not tilt the market to punish providers who manage to grow their business. Efficient providers will have stronger incentives to invest and compete if they can reap the same benefits per added customer as their competitors. Economics teaches that competition at the margin is crucial and tiered-rate plans tend to place a thumb on the scale against successful companies and in favor of less successful ones. That is, rational providers considering improvements of quality (for example, in this market, reducing latency so that the calls are closer to the functional equivalence of a regular voice call) compare the marginal cost of those improvements to the marginal profit they can get. Since TRS prices to end consumers are fixed at zero, the only way providers can benefit from investing to improve quality is by winning additional business. The marginal profit depends on the rate the provider gets for additional minutes over its current business and not on the average rate the provider receives for all minutes.

D. Inefficiency

Tiered rates create undesirable economic incentives in the short and in the long run. Hamilton's First Brattle Report comes to similar conclusions:

A perhaps more salient consideration than the immediate effect of a tiered rate structure is the dynamic effect such a structure would likely have on funding needs. A tiered structure not only tolerates, but in fact promotes and subsidizes inefficiency.¹⁰

1. Reduced incentives to realize economies of scale.

Tiered rates can blunt the incentives for small firms to grow. To the extent that there are economies of scale in IP CTS, which, as noted, the FCC lacks data to assess, the FCC should set a rate structure that encourages providers to reach minimum efficient scale and lower the overall cost of service provision. In contrast, tiered rates could discourage providers from reaching the efficient scale. The reason is that if the marginal rate at the efficient scale is below the average rate (for example, in a two-tier structure, if the efficient scale is reached at tier 2), firms have lower incentives to reach the efficient scale under tiers than under a simple uniform rate.

2. Disincentives to invest in cost reductions

Tiered rates also reduce incentives to make investments that reduce unit costs. With uniform rates, a provider can reap the benefit of investments that reduce unit costs over all existing customers and additional customers it could add. With a tiered approach, if growth would move the provider to a lower tier (or tiers are reset based on the lower costs as discussed in the next section), the marginal return to such investment would be

¹⁰ First Brattle Report 38.

greatly reduced. Therefore, tiered systems would tend to reduce incentives for such investments.

A concrete example of a cost reducing investment might be software that would improve utilization of call assistants from 30% to 60%, reducing labor costs.¹¹ The return on that investment would depend on over how many minutes that investment would be applied and at what rates those minutes would be reimbursed. If the rates go down significantly with scale, the return from this investment is diminished and a provider may rationally choose to forego it, even though it would be socially optimal to make such an investment.

Even though static returns from cost-reducing investments are the largest for providers with many customers, smaller providers should not be, or more importantly do not need to be, subsidized to make such investments. The smaller providers should be forward looking and realize that with lower unit costs they have the opportunity to grow their business and reap the benefits of those investments. Such growth would be efficient since after making those investments they should be able to take market share from less efficient providers. Such forward-looking calculations are undertaken every day in markets across the country by small new entrants.

A tiered system does the opposite to the incentives to grow: if growing means moving to a tier with a lower marginal rate, a provider would obtain a smaller ROI on those additional minutes, disincentivizing investments.

¹¹ These are hypothetical numbers for illustrative purposes.

3. Expectation of future tier changes

Finally, should the FCC introduce tiered rates into this market, rational providers might expect that future rates will adjust according to the philosophy of punishing large providers and subsidizing small, higher-cost providers. Such a rational expectation would create further disincentives to compete for customers, invest in cost reductions, and realize economies of scale. These rational expectations will further reduce economic efficiency and lead to higher overall costs of the provision of this service.

E. Higher costs to the TRS Fund

By creating these perverse incentives, a tiered-rate policy would likely lead over time to higher total costs for the TRS Fund. Compare two rate structures, one with a uniform rate and one with two tiers of rates, but with the same average rate, where the average is computed using last-year's market shares. If market shares remained stable, the two rate structures would result in the same total cost to the fund. Over time, however, tiers create incentives for market shares to change in the direction of smaller providers who are reimbursed at the higher rate, increasing total payments from the TRS Fund. The reason is that under the tiered rate, the large providers have less incentives to add customers than under the uniform rate. Also, the small providers have stronger incentives to add customers than under the uniform rate, up to the limit of the first tier. The penalty imposed on the larger providers will make their market shares shrink towards the limit of the first tier, relative to the uniform rate regime. At the same time, the subsidy offered to the small providers will make their shares grow up to the limit of the first tier.

Since the lower-tier rate is higher, such shift in the market shares would increase total payments from the TRS Fund.¹²

The First Brattle Report also concludes that the tiered-rate structure will increase costs inefficiently:

However, subsidizing providers is unlikely to result in a reduced burden on the TRS Fund. Indeed, the opposite is likely true. Subsidizing perpetually inefficient providers will increase average costs.¹³

F. Perverse incentives for wholesaling

Currently both integrated operators and a wholesaler, CTI/Ultratec that works with retailers including Hamilton and Sprint, provide IP CTS. Tiered rates have particularly harmful unintended consequences in markets served by a mixture of business models.

First, a wholesaler providing capacity to multiple service providers would benefit much more from the subsidies offered to small retail providers than its total scale would call for. For example, suppose there are 3 providers, A and B obtain service from a wholesaler and each have 100 million minutes, while provider C offers service directly and has 200 million minutes, so that the wholesaler and provider C have the same scale. Suppose a tiered-rates system has a high rate for the first 100 million minutes and a low rate for additional minutes. That means, that even though provider C and the wholesaler are economically very similar, the tiered system would unfairly reward the wholesale

¹² If the marginal costs of providing service are lower for the large providers than for the small providers, this shift of market shares will also create economic deadweight loss. Expected IP CTS growth in the near term would exacerbate this problem as both shares and an inefficient absolute number of the new minutes would be provided by high-cost firms.

¹³ First Brattle Report 38-39.

business model.¹⁴ As we explained above, the tiered system is effectively a subsidy for the small providers. As this example shows, a wholesaler working with two small clients would result in double subsidies paid to the two “small” providers.

Second, since a tiered system rewards the wholesaler business model, it would create incentives for more providers to use that model.¹⁵ Instead of providers growing and seeing their marginal rates decrease as they reach larger tiers, the wholesaler would be better off by attracting new, small retailers who would operate with the wholesaler’s scale but still obtain the subsidy for small-scale providers (with the subsidy somehow then being split between the large wholesaler and the small retailers). This strategy would increase the costs to the TRS Fund and reduce economic efficiency by proliferating the number of retail providers without any economic rationale other than the arbitrage of the tiered-rates system.

Finally, a tiered system would create incentives for the large providers to incur costs inefficiently to subcontract some of their minutes to smaller third parties who would then benefit from the higher rates (and could pass on some of those subsidies to the wholesale providers).

For example, if CaptionCall decided to create and spin off two downstream firms with 50% of its market share each and provide service to them as a wholesaler, wholesaler CaptionCall would be in an analogous economic position to CTI/Ultratec and

¹⁴ That is, compared to the situation where service providers A and B are acquired by the wholesaler, operating separately creates a double subsidy for the three firms and that extra subsidy would be split between these three firms, putting provider C at a disadvantage.

¹⁵ We understand that wholesalers like CTI/Ultratec are not certified providers and not covered by the FCC rules for IP CTS providers.

would be able to benefit from the double subsidy. Using the Brattle Group proposal from its second report¹⁶ and CaptionCall's projected [BEGIN HIGHLY CONFIDENTIAL INFORMATION: ██████████ :END HIGHLY CONFIDENTIAL INFORMATION] annual minutes,¹⁷ such a split by CaptionCall would increase the cost to the TRS Fund by over [BEGIN HIGHLY CONFIDENTIAL INFORMATION: ██████████ :END HIGHLY CONFIDENTIAL INFORMATION] a year.¹⁸ Even if such a split would imply some additional costs, the increase in the reimbursement would be sufficiently large to make it profitable.

G. No need to subsidize entry

If the FCC wants to subsidize entry of new providers with the aim of increasing the number of providers in the market, such subsidies should be fair, transparent, and short-lived.¹⁹

In our opinion, such subsidies are not necessary in IP CTS. First, there are a large number of current operators that should be economically viable with a reasonable uniform rate (for example, set via an auction with appropriate guardrails). Second, barriers to entry are low and new providers can enter and have entered. Entry costs are particularly low because new entrants can contract with CTI/Ultratec or other wholesale

¹⁶ Coleman Bazelon & Brent Lutes, Brattle Group, *IP CTS Costs, Revenues, and Rate Structure* (June 13, 2019) ("Second Brattle Report"), attachment to letter from David A. O'Connor, Counsel for Hamilton Relay, Inc. to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 03-123 (June 17, 2019), https://ecfsapi.fcc.gov/file/1061708681718/Hamilton_ex_parte_June_17_2019.pdf.

¹⁷ RL Report, Exhibit 1.3-1.

¹⁸ CaptionCall would have the same incentives under other providers' tiered-rate proposals.

¹⁹ In addition, there should be some clear framework for determining the efficient level of entry.

providers to realize the wholesalers' economies of scale (at least temporarily while they ramp up their own call center operations). Third, as discussed in the First Brattle Report,

Moreover, emergent providers should not need to be subsidized. Other providers have entered the market without subsidization and two new providers are currently applying for certification all without the promise of tiers or emergent rates. This is because capital markets will support market entry without subsidizing inefficiency, as long as reasonable earnings can be expected and reimbursement rates are stable and predictable.²⁰

In fact, CaptionCall was a new entrant relative to Hamilton and Sprint and has shown how to succeed on a level playing field.

Even if the FCC wanted to provide additional subsidies to new entrants, the tiered system creates unequal subsidies, picking winners and losers (see our analysis of the concrete proposals below for the calculation of the unequal subsidies they present). Moreover, the subsidies implied by tiered rates are not short-lived, undermining their usefulness in providing incentives for new entrants to grow and invest in cost reductions.

III. IP CTS Is Different from VRS

The differences between VRS and IP CTS are significant and the FCC should not simply import the tiered-rates model from VRS into IP CTS.

A. There are more providers and more recent examples of successful entry in IP CTS than in VRS

First, there are more providers of IP CTS than VRS and the market shares are much more balanced. With five providers, there is a healthy amount of competition

²⁰ First Brattle Report 39.

among IP CTS providers and hence, compared to VRS, there is less need to support new entry.

Second, the provider with the largest market share, CaptionCall, is a newer entrant (2011) than two other large providers, Sprint (2007) and Hamilton (2007). CaptionCall's experience shows that entry is feasible and can be accomplished without subsidies. Even with economies of scale, a rational entrant relying on a stable rate policy can internalize the expected returns from the investments in cost reduction and growth as CaptionCall did. In addition, InnoCaption entered and **[BEGIN HIGHLY**

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[REDACTED] **:END HIGHLY**

CONFIDENTIAL INFORMATION].²¹ So, history shows that no subsidies are necessary to promote competition and entry.

B. Barriers to entry are much lower in IP CTS than in VRS

1. Easier access to the necessary labor force

It is much easier to enter and grow to provide IP CTS than VRS because of a cheaper and more widely available pool of potential employees providing the final service. Labor costs are much lower and labor availability is much higher for IP CTS because the skills required are less specialized (at least for providers using speech recognition to assist CAs in creating captions). For example, the costs of training CAs for the IP CTS jobs are much lower than the costs of training VRS interpreters, in particular there is no need to know American Sign Language for the IP CTS jobs.

²¹ RL Report, Exhibit 1.3-1.

2. Scale

Moreover, entry in the IP CTS market is easier because unlike in VRS, there is a wholesaler, CTI/Ultratec, that already operates at [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] combining the market share of Hamilton and Sprint, using the minutes data presented in the RL Report. In IP CTS, a new entrant can immediately benefit from economies of scale by contracting with CTI/Ultratec or by contracting with one of many business process outsourcing firms that offer similar services. In VRS, wholesalers of core VRS functions are required to be certified VRS providers, which limits potential wholesalers.

3. Market growth

IP CTS minutes of use have been growing rapidly. Much of that increase is due to new users of IP CTS. A new entrant is on an even footing to win business from a new user since there will not be any switching costs. Exhibit 1-3 of the RL Report shows a projected 17 percent growth in minutes from 2018 to 2019 and another 17 percent on top of that from 2019 to 2020. In contrast, demand for VRS has been stable over the past few years and is projected to stay that way.²²

C. IP CTS is on the verge of a major change in technology

While VRS is a mature service with an established business model that is unlikely to change dramatically in the next several years, that is not true of IP CTS. CA-based IP

²² Rolka Loube, *2019-2020 Rates & Demand Forecasts*, slide 20 (Apr. 9, 2019), <https://ecfsapi.fcc.gov/file/10503037094514/Appendix%20F%20-%20RL%20%20April%202019.pdf>; June FNPRM, 33 FCC Rcd at 5804 ¶ 8 (VRS has exhibited “relatively flat demand ... over the past few years”).

CTS technology is likely to be replaced/substituted (at least partially) by new automated speech recognition (“ASR”) technologies in the next several years. Therefore, subsidizing new entrants into the old technology is a bad economic policy. Instead, the FCC should design policy to incentivize investment into the new, low-cost technology. Given the current status of technology, it seems that automated options should become feasible in IP CTS much sooner than in VRS. Therefore, the focus of the policy in the IP CTS market should be a partial transition to the ASR technology without sacrificing quality of service. Since ASR is likely to be less expensive than the current technology, the savings from ASR should dwarf any imagined savings from fine-tuning the rates for CA-based service and it will be important to set rates for ASR that encourage deployment and adoption of that technology.

IV. Tier Proposals in the Record Are Self-serving and Flawed

As discussed above, tiered rates have several flaws that are especially relevant for the current state of IP CTS. Moreover, specific proposals presented by existing providers are effectively self-serving requests for subsidies. As stated in the First Brattle Report, “Indeed, the incentive of a provider advocating for tiered rates is to construct tiers in a way that advantages that provider over its competitors.”²³ Finally, all proposals in the record rely on costs submitted by the providers that multiple parties describe as incomplete or otherwise not reliable for rate-setting purposes.²⁴ As we explained above,

²³ First Brattle Report 38.

²⁴ Letter from David. W. Rolka, Administrator, TRS Fund, to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 03-123 and 13-24, at 4 (Dec. 4, 2018); Comments of Hamilton Relay, Inc. CG Docket Nos. 13-24 and 03-123, at 13 (Sept. 17, 2018); Letter from Rebekah P. Goodheart, Counsel for CaptionCall LLC, to Marlene H. Dortch, Secretary, FCC CG Docket Nos. 13-24 and 03-123 at 1-2 (May 29, 2018).

setting tiered rates without necessary information about true cost curves (not only true costs but also how those costs vary for each provider with scale and why) could be particularly problematic.

A. *The Brattle/Hamilton proposal*

The Second Brattle Report describes a potential structure for tiers but does not present any new economic arguments that would counterbalance all the arguments against using tiered rates discussed in the First Brattle Report or above. Therefore, the logical conclusion is that Brattle/Hamilton continue to agree that tiered structures are inappropriate for this market – a conclusion confirmed by their conditional statement “*if* a tiered structure is to be implemented...” and the very careful title of the slide “Two-Tiered Structure is Most Appropriate Tiered Structure for IP CTS” that evades their earlier conclusion that tiered structures are inappropriate.²⁵

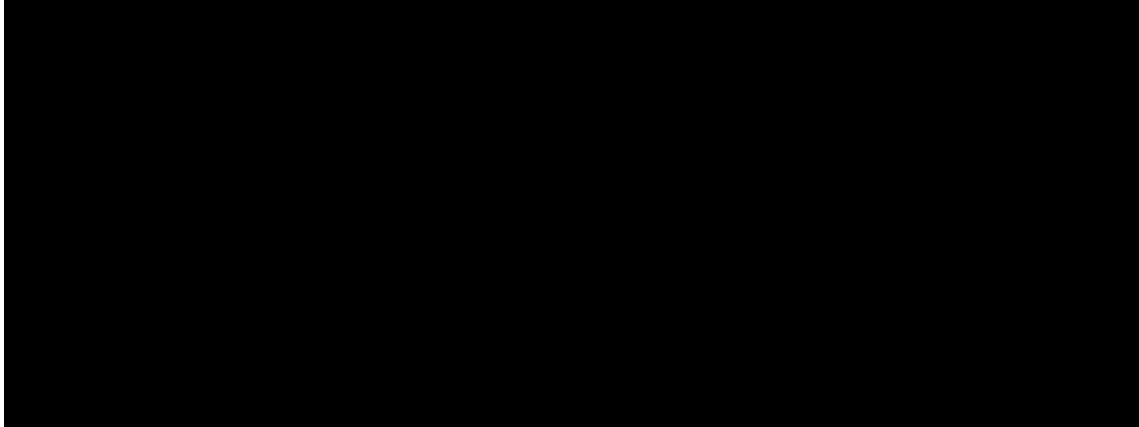
The specific proposal Brattle/Hamilton present is self-serving as Brattle itself predicted: Hamilton is a big winner. Table 1 shows Brattle’s projected annual minutes and the rate they propose for every provider.²⁶

²⁵ Second Brattle Report, Slide 16 (emphasis added).

²⁶ Columns 1-3 are from Second Brattle Report, Slide18.

TABLE 1: Implied Subsidies in the Brattle/Hamilton Proposal

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The Implied Subsidy is computed as follows. The proposed tiers together with the projected minutes imply average reimbursement rate of \$1.58. Therefore, the proposed rate of \$1.76 implies that Hamilton advocates to receive a subsidy over the average rate in the amount of $(\$1.76 - \$1.58) * [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]$ minutes a year = $[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]$ a year.

The calculations show that Hamilton's proposal is to offer the largest subsidy to Hamilton $[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]$. At the same time, it suggests smaller subsidies for three other providers and a tax on the largest provider (of about $[BEGIN HIGHLY$

CONFIDENTIAL INFORMATION: [REDACTED] **:END HIGHLY CONFIDENTIAL INFORMATION]** a year).

As the economic reasoning we discussed above suggests, that subsidy will likely change the market shares since the smaller providers will have stronger incentives to grow than the largest provider. The Second Brattle Report seems to recognize the incentives for relocation of market shares and they propose a large enough range for Tier 1 to accommodate **[BEGIN HIGHLY CONFIDENTIAL INFORMATION:** [REDACTED] **:END HIGHLY CONFIDENTIAL INFORMATION]** growth of Hamilton. If their proposal leads to such a growth of market shares, the consequence would be increased subsidies for the four providers and an increased cost for the TRS Fund.

To illustrate the extent of that higher cost and higher subsidies, suppose we keep total number of minutes fixed and consider a 50% growth of the four IP CTS providers other than CaptionCall (and a corresponding shrinkage of the largest provider so that total minutes remain constant). **[BEGIN HIGHLY CONFIDENTIAL INFORMATION:**

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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Finally, the Brattle proposal is to reimburse large providers (in this case singling out CaptionCall) \$1.40 for *all minutes* and not just minutes above the Tier 1 cutoff. Brattle recognizes that their proposal could imply that the reimbursement of a provider *drops* as they add minutes beyond Tier 1 and to fix it, they propose that the

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reimbursement would be based on the greater of the amount calculated at the Tier 2 rate and the amount a provider would be paid on Tier 1 for 15 million minutes a month. The implication of this arbitrary alleged “fix” is that CaptionCall would be paid on the projected minutes beyond the Tier 1 threshold at an average of [BEGIN HIGHLY CONFIDENTIAL INFORMATION: ██████████ :END HIGHLY CONFIDENTIAL INFORMATION] per minute.²⁷ So, the Brattle/Hamilton proposal is that Hamilton be paid [BEGIN HIGHLY CONFIDENTIAL INFORMATION: ██████████ :END HIGHLY CONFIDENTIAL INFORMATION] the rate that CaptionCall would be offered on minutes beyond the first tier. At [BEGIN HIGHLY CONFIDENTIAL INFORMATION: ██████████ :END HIGHLY CONFIDENTIAL INFORMATION] per minute, it is likely not economically rational for CaptionCall to serve any minutes beyond Tier 1 and hence one likely outcome of the Brattle/Hamilton proposal is that all providers would be paid \$1.76 per minute and CaptionCall will lose market share to smaller providers, [BEGIN HIGHLY CONFIDENTIAL INFORMATION: ██████████ :END HIGHLY CONFIDENTIAL INFORMATION].

The Brattle/Hamilton proposal does not explain why, despite their previous logical arguments, the FCC should be penalizing the largest and likely the most efficient provider in the market and offering subsidies to the smaller IP CTS providers and, the

27 [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED]
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largest subsidy to Hamilton.²⁸ They provide no connection between the \$1.40 rate and costs of the providers or whether the providers could be profitable at that rate. In fact, they simply pick an average rate overall, and then use \$1.76 as the Hamilton/small provider rate and get \$1.40 as a residual rate to make their assumed average work without any view about reasonableness of that rate (especially odd given their earlier exhortations about the problems of a tiered-rate structure).

B. ClearCaptions’ proposal

ClearCaptions’ proposed tiers are summarized in Table 2 below.²⁹

TABLE 2: ClearCaptions Tiered-Rates Proposal

	Minutes per Year	Proposed Rate per Minute
Tier 1	0 – 42 million	\$1.9467
Tier 2	42 – 84 million	\$1.4289
Tier 4	84 – 120 million	\$1.2475
Max Tier	above 120 million	\$1.0403

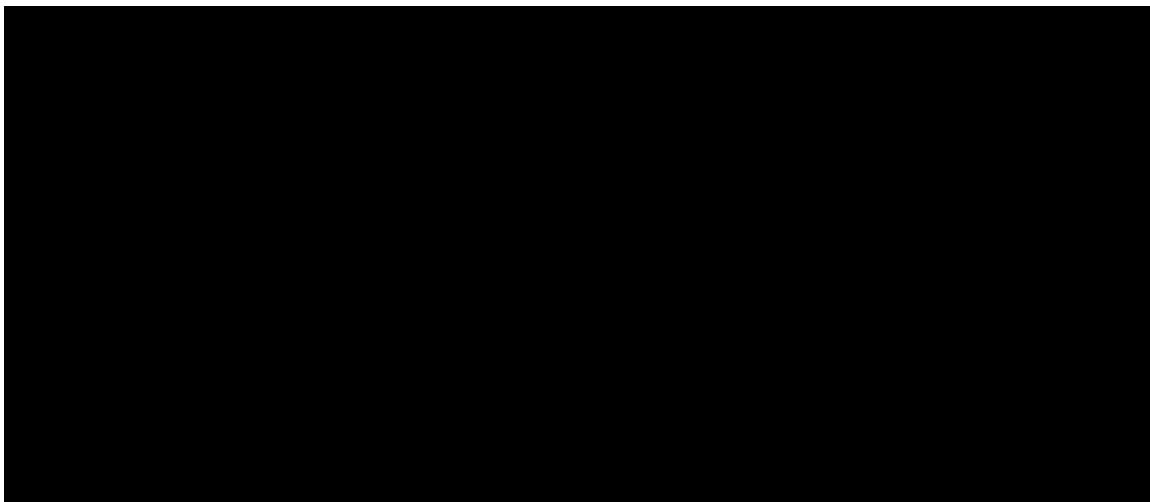
Combining these rates with the projected annual minutes in the RL Report, we can compute the average reimbursement rate for each provider and overall:

²⁸ We note that Sprint is not a “small” company relative to CaptionCall but is [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION].

²⁹ ClearCaptions, *Cost Trends and Tiers* Slide 5 (June 12/13, 2019), attachment to letter from Tamar Finn, Counsel to ClearCaptions, LLC to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 03-123 (June 14, 2019), https://ecfsapi.fcc.gov/file/10614074025199/REDACTED_Ex%20Parte%20Notice%20of%20Meetings%20with%20Commissioners%20Advisors.pdf.



TABLE 3: Implied Subsidies in ClearCaptions’ Proposal

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The implied subsidies are computed the same way as in our analysis of the Brattle/Hamilton Proposal: we compare the reimbursement providers would receive in the case of a uniform rate equal to the average cost per minute implied by the proposal.³⁰

As is immediately apparent, ClearCaptions’ proposal is to offer the highest subsidy, almost **[BEGIN HIGHLY CONFIDENTIAL INFORMATION:** **:END HIGHLY CONFIDENTIAL INFORMATION]** a year, to ClearCaptions, and smaller subsidies to the other three providers. At the same time, they suggest taxing the largest provider at over **[BEGIN HIGHLY CONFIDENTIAL INFORMATION:** **:END HIGHLY CONFIDENTIAL INFORMATION]** a year.

On slide 2 of its presentation, ClearCaptions argues that its rationale for the tiered rates is to reflect the cost structure that includes “significant fixed costs.” It offers three

³⁰ Our total minutes are higher than in ClearCaptions’ presentation because we have used the projected minutes from the RL Report for the 2019-2020 year rather than the 2018-2019 year used in ClearCaptions’ calculations.

price points and volume thresholds at which it claims that ClearCaptions would break even. While the three points are not exactly consistent with a simple cost structure of a fixed cost and a constant variable cost, looking for a structure that fits this data suggests a structure of about [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] in fixed costs and [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] per minute in variable costs.³¹ With a [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] markup on the variable cost, that would require reimbursement of [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] per minute. This reveals the self-serving nature of ClearCaptions' proposal: [BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION]. The fact that at higher tiers providers could be operating at a marginal loss implies that larger operators could be effectively forced to shrink their operations to Tier 3 or 2 to break even. In other words, this proposal is an attempt to obtain a large subsidy for ClearCaptions in the form of a high average rate and to cripple larger competitors

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³¹ We obtained these numbers by looking at the three possible pairs of the three data points they provided, solving for the fixed cost and variable cost implied by the break-even claims, and then we averaged the three solutions.

[REDACTED] :END HIGHLY CONFIDENTIAL INFORMATION] by offering them very low marginal rates.

C. InnoCaption’s proposal

InnoCaption’s tiered proposal is summarized in Table 4.³²

Table 4: InnoCaption’s Tiered-Rates Proposal

	Minutes per Year	Rate
Tier 1	0 – 12 million	\$1.95
Tier 2	12 – 30 million	\$1.65
Tier 3	Above 30 million	\$1.25

While InnoCaption’s Tier 1 is very similar to ClearCaptions’ proposal, note that InnoCaption suggests applying it to only the first 12 million minutes a year while ClearCaptions applies it to the first 42 million minutes a year – [BEGIN HIGHLY

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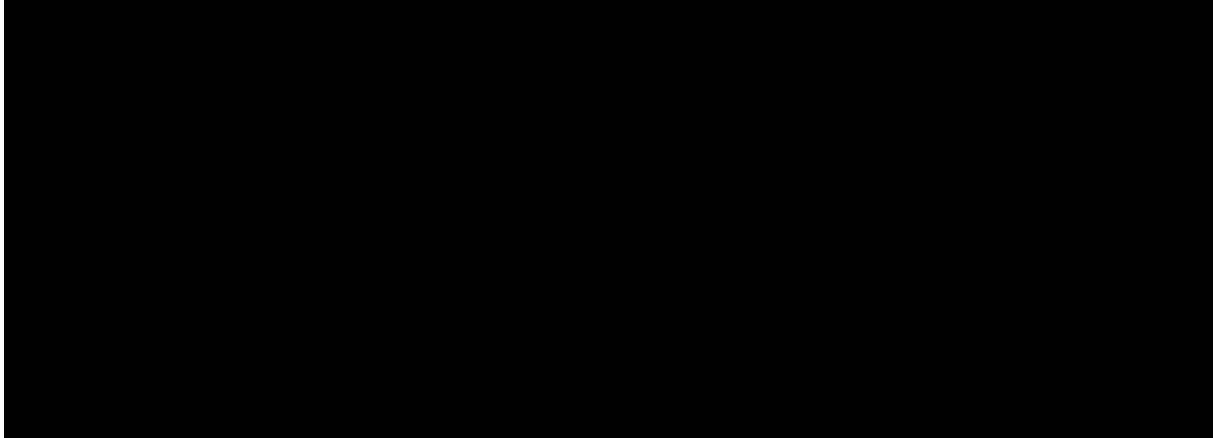
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INFORMATION]. Using the same projected annual minutes as before, we can compute the implied subsidies associated with this proposal:

³² InnoCaption, *Business Progress Update* Slide 8 (Mar. 6, 2019) (“InnoCaption Update”), attachment to letter from Cristina O. Duarte, Director of Regulatory Affairs, MezmoCorp (dba InnoCaption) to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 03-123 (Mar. 8, 2019), https://ecfsapi.fcc.gov/file/1030955604150/MezmoCorp_Ex%20Parte%20Presentation_REDACTED%20FOR%20PUBLIC%20INSP%20ECTION_3.6.2019.pdf.

Table 5: Implied Subsidies in InnoCaption’s Proposal

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Comparing it to the other two proposals, InnoCaption’s proposal results in a higher subsidy for InnoCaption than the other two proposals. Moreover, it results in much lower subsidies for the other providers.

InnoCaption’s proposal does not provide much explanation about the basis for these rates beyond a statement that “We have developed our own cost curve projection to form the basis of the following proposed tiered rate structure.”³³ Relying on InnoCaption’s individual cost curve is problematic for at least two reasons. First, InnoCaption’s app-only service can have quite different costs from the services provided by other providers and since many end users do not have smartphones, basing rates on costs of a provider that is only capable of serving a particular segment of the market is problematic. Second, if the figure on slide 8 of its presentation were indeed showing a realistic cost curve, then the \$1.25 rate for minutes above 2.5 million a month that

³³ InnoCaption Update 8.

InnoCaption proposes does not seem to be sustainable for most of the providers, including InnoCaption should it grow.

D. The FCC should not adopt the tiered-rate proposals

The FCC should be wary of self-serving proposals that reward the proponent with a high rate given its current market penetration and try to underpay the proponent's competitors. Such proposals are aimed at gaining competitive advantage and creating the false promise of large savings to the TRS Fund that could be used to pay the subsidy.

Such rates are likely to backfire – if the marginal rates in the higher tiers are too low, this will result in shrinking of the largest service providers and hence less efficient provision of service, higher total cost for the TRS Fund and all the other negative consequences of tiers that we discussed above. Such risk is particularly large given the lack of information about the actual cost curves and the nature and degree of economies of scale.

V. Auctions and Rate Caps

Setting a stable, predictable and fair rate policy is especially important given the potential technological improvements that will transform this service towards much less reliance on human call assistants.

The largest economic efficiencies and savings to the TRS Fund will likely come from this technological transition. Therefore, how to set rates to stimulate innovation is the most important policy decision that the FCC is facing for the IP CTS market. An auction described in Dr. Skrzypacz's auction submission is a practical way to set rates to

achieve this goal over the longer term.³⁴ If the FCC feels that it will take time to set up an auction, it should use a price cap, as proposed by CaptionCall, applied to all providers in the interim. A flat rate cap and then an auction-determined rate will not have the negative incentive effects of the tiered-rate proposals. Instead, these uniform flat rates will provide efficiency-enhancing incentives and push minutes to low-cost providers, saving the TRS Fund money over the longer term.

In terms of outcomes of the auction, it is hard to predict the bids of different bidders because those depend on the relevant marginal costs of the providers which are hard to estimate for outsiders (in fact, it is because the true marginal costs are hard to estimate for outsiders that an auction would be a good way to set the rates at a competitive level without the need for further FCC cost analysis and the risk of a massive exodus of providers in case the rate is set too low).

That said, we can present a calculation of the outcome of an auction based on hypothetical auction participants illustrated in Table 6.

Table 6: Hypothetical Reservation Prices

Hypothetical Provider	Hypothetical Reservation Prices
A	\$1.45
B	\$1.50
C	\$1.55
D	\$1.60
E	\$1.70

³⁴ Andrzej Skrzypacz, *Reverse Auction Proposal for setting IP CTS rates* (Sept. 17, 2018), appendix D to Comments of CaptionCall, LLC, CG Docket Nos. 13-24, 03-123 (Sept. 17, 2018) (“Auction Proposal”).

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In this example, we have five providers with different price points at which they would exit the auction (i.e., with different reservation prices). With these hypothetical numbers, providers A and B would stay the longest in the auction and the winning rate would be \$1.50 per minute (approximately, depending on the bid increments in the auction). According to the Auction Proposal, the winning bidders would be the two bidders who stayed till the end of the auction (Providers A and B) and any bidder who exited the auction at a rate within some range of the winning rate.

For example, if the chosen range is 10%, then bidders C and D would also be winners since they would still be active in the auction at the \$1.65 per minute threshold (and they would get the same winning rate of \$1.50). Only provider E would be not win in the auction with these bids. However, provider E would be allowed to serve its existing customers at \$1.50 a minute (or a somewhat higher rate if the FCC decides to apply a glide path to the new rate established in the auction that the Auction Proposal suggests).

While these hypothetical numbers are not reliable for predicting the outcome of the auction, these simple calculations show that the auction could drive cost reductions without major disruptions of the market. It is possible for all the providers to stay active in the market, provided they can negotiate better contracts or reduce their costs in another way. The right to continue serving existing customers and come back to the market for new customers in the next auction would provide stability of service for consumers and plenty of opportunity for providers to remain competitive.

A. Criticisms of the CaptionCall Auction Proposal are misplaced

In addressing Dr. Skrzypacz’s auction submission, ClearCaptions’ analysis is based on several misunderstandings about the logic of the Auction Proposal and therefore its criticisms are misplaced.³⁵ In addition, its auction expert, Dr. David J. Salant, discussed the pros and cons of an auction approach to set IP CTS rates in his report in October 2018 and exhibited similar misunderstandings about the auction proposal.³⁶

We agree with Dr. Salant’s opinion that the FCC policy should not be to minimize short-term costs but the long-run net present value of costs and to ensure the quality of service provided (including the right to choose by customers). Hence, we also agree that good policy should take into account the long-term incentives it creates.

We agree with Dr. Salant that “The objectives of the FCC include incentivizing suppliers to provide high quality IP CTS services that enable customers with hearing disabilities to become fully functional members of society,”³⁷ while at the same time avoiding unnecessarily high service cost. We also agree that “Given these objectives, it is important for the IP CTS rate-setting mechanism to incentivize service providers to invest in R&D (...) so as to (i) improve efficiency (ii) maintain/increase service quality (...).”³⁸ We also agree that competition is a good way to provide such incentives.

Despite the agreement about the goals, we disagree about the best policies that would achieve them. For the reasons discussed above, auction-set rates or a uniform rate

³⁵ ClearCaptions Reverse Auction Talking Points, attachment A to letter from Russell M. Blau & Tamar E. Finn, Counsel for ClearCaptions, LLC to Marlene H. Dortch, Secretary, FCC, CG Docket Nos. 13-24, 03-123 (July 26, 2019) (“ClearCaptions Reverse Auction Talking Points”), [https://ecfsapi.fcc.gov/file/10726914613428/FINAL%20-%20ClearCaptions%20Ex%20Parte%20re%20Reverse%20Auctions%20\(7-26-2019\).pdf](https://ecfsapi.fcc.gov/file/10726914613428/FINAL%20-%20ClearCaptions%20Ex%20Parte%20re%20Reverse%20Auctions%20(7-26-2019).pdf).

³⁶ Salant Rebuttal Report.

³⁷ Salant Rebuttal Report ¶ 11.

³⁸ Salant Rebuttal Report ¶ 12.

provide better incentives than a tiered-rate structure especially when the setting of tiers has no basis-in-fact about actual cost structures or the effect on promoting future efficiency, competition, or innovation. Auctions are especially beneficial given the lack of reliable information about costs and economies of scale.

In addition, we explain why specific points in ClearCaptions’ submission and Dr. Salant’s report are incorrect:

- 1) Dr. Salant provides no support for his description that “[t]he IP CTS market is featured by imbalanced market shares, significant fixed costs and economies of scale.”³⁹ Demonstrating significant economies of scale appears to be a necessary, but not sufficient, condition for his conclusion that tiered rates are a reasonable policy.⁴⁰
 - a) ClearCaptions and Dr. Salant did not present evidence of significant fixed costs or that variable costs would significantly drop at a larger scale. Simply pointing out that **[BEGIN HIGHLY CONFIDENTIAL INFORMATION: [REDACTED]**
[REDACTED]
[REDACTED]
[REDACTED]
:END HIGHLY CONFIDENTIAL INFORMATION]. In fact, the First Brattle Report shows that given the current minutes served by the providers, there is no evidence of significant economies of scale.

³⁹ Salant Rebuttal Report ¶ 2; *see also, id.* ¶ 7.

⁴⁰ As we explained above in Section 2, even if there are economies of scale, a tiered-rate system would not be optimal as it would provide incentives for firms to operate with higher costs (with some possibility of an exception limited time “tier” for new entrants if that were deemed necessary and useful).

Figure 5 below shows the relationship between provider volume and cost. It is clear that there is very little relationship between reported costs and the volume of minutes a provider provides.⁴¹

Dr. Salant also agrees that the FCC should not adopt rates without evidence of economies of scale,

And the FCC should not base its decision on less than hard evidence about where economies of scale kick in.⁴²

b) As we showed above, even if there are economies of scale in IP CTS it should be relatively easy for IP CTS providers to achieve quickly the benefits of economies of scale and policy should encourage them to do so. Providers have access to third parties with large scale (including CTI/Ultratec) and hence can get benefits of scale economies even with small market share. Moreover, as Dr. Salant points out, an aging population will increase demand for IP CTS, so even with fixed market shares providers will benefit from any economies of scale that may exist. There is no need for the FCC to subsidize less efficient providers in the name of undocumented economies of scale.

2) ClearCaptions claims that an auction would result in a near-impossibility of future competitive entry.⁴³ This is not true. Auction-based rates would provide new entrants a stable environment in which they could be assured a positive return on investment if they can enter competitively, even with slightly higher costs than incumbents. If – despite there being five incumbent providers – the FCC decided to remove a possible

⁴¹ First Brattle Report 36. As discussed above in Section II.B, while there may be some fixed costs, the data do not indicate a significant role for economies of scale relative to management skill.

⁴² Salant Rebuttal Report ¶ 37.

⁴³ ClearCaptions Reverse Auction Talking Points, point 1.b.iii: (“As a result, the market would be artificially constrained to a duopoly, ... virtually eliminating pressure on the winners to reduce their costs or improve their service quality going forward due to near-impossibility of future competitive entry”).

barrier to entry by subsidizing new entrants, such subsidies could be incorporated into an auction design. Tiered rates are not the right policy instrument to promote entry.

- a. Dr. Salant argues that the FCC may find it in the public interest to subsidize new entrants who, if successful, could provide additional choice and lower costs to the market. If the FCC wanted to support such entry (without any significant due diligence about the business plan, acumen and likely success of all potential entrants and then picking winners), the key element of such a policy should be for such subsidies to be short lived. Such policy should be about subsidizing new entry and not about subsidizing inefficient providers' taking advantage of high rates in low-volume tiers. Any such policy should be limited to subsidies no longer than some pre-specified time horizon (for example, one year).
- b. Such subsidies could easily be incorporated into the auction design. In fact, Section III.C.7 of the Auction Proposal discusses special provisions that the auction could have for small providers and new entrants. As stated there, the auction-based rates could allow new entrants to offer service at the market rate without participating in the auction.⁴⁴
- c. Finally, market evidence shows that differential subsidies are not necessary. Entry has occurred in IP CTS – InnoCaption and CaptionCall both were new entrants and **[BEGIN HIGHLY CONFIDENTIAL INFORMATION:**

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⁴⁴ If the FCC decided to additionally subsidize such new entrants, it could do so in many ways consistent with the auction. For example, it could offer new entrants a rate that is 10% above the market rate for one year on some limited number of monthly minutes.

CONFIDENTIAL INFORMATION] Rates set via auctions would send the right signal to the potential entrants: if you can achieve lower costs than incumbents, then you should enter and reap the benefits (and make the market more efficient at the same time).

- 3) ClearCaptions’ and Dr. Salant’s claim that the auction is “hardwired to select only two or perhaps three unique winning bidders” is simply wrong.⁴⁵ The auction is designed so that, for example, the fourth and fifth least efficient suppliers could be winning bidders.⁴⁶ An important element of the Auction Proposal is that it is flexible to allow several winners. Moreover, the Auction Proposal allows both for new entry and for losing bidders to maintain their business while trying to reduce costs.

A bidder in the auction should be rationally forward looking: their bids should not depend on their costs *today* but on the expected costs over the duration of the contract (i.e., until the next auction). If a provider expects that after winning, they can bring their costs down, they should bid aggressively. Even if a provider loses in an auction, it would have plenty of opportunity to reduce its costs and become a winning bidder in the next auction, while in the meantime having the ability to continue serving its customers. Such a design provides very strong incentives for providers to lower their costs.

As discussed in Section 8 of the Auction Proposal, the FCC would choose the auction frequency to balance the ability of losing bidders to ‘get back to the game’ with the need to provide a stable environment for service providers.

⁴⁵ Salant Rebuttal Report ¶ 24; *see also* ClearCaptions Reverse Auction Talking Points, point 1.b.i.

⁴⁶ Auction Proposal, Section III.A, *Rate and Winner Determination*.

Dr. Salant cites Dana and Spier (1994) saying that “the optimal government mechanism for auctioning production rights is one in which the market structure is endogenous, that is, the number of participants awarded production rights may depend on their bids.”⁴⁷ Endogenous market structure⁴⁸ is exactly what the Auction Proposal would achieve.

- 4) The illustrative example in Dr. Salant’s report is flawed and in fact shows the benefits of the auction. Dr. Salant creates a number of hypothetical situations in which an omniscient regulator with perfect knowledge of costs might be able to pick winners with targeted subsidies. However, his hypothetical examples have no basis in the reality of the costs or provision of IP CTS and would not be appropriate for implementing a policy that would cost hundreds of millions of dollars in added expense for the Fund. Even taking the numbers in the example in Section VI.B (and continued in the Appendix) of his report at face value, the analysis is wrong. First, Dr. Salant states that “It is a dominant strategy for each supplier to drop out at their true average cost at the time of the auction.”⁴⁹ This is incorrect for several reasons, the main being that rational, profit-maximizing bidders should be forward-looking: if a service provider expects lower costs during the rate period, it should bid accordingly, no matter what are its costs now. Second, correcting this mistake implies that if Supplier B in Dr. Salant’s example would achieve a lower average cost than Supplier A then Supplier B would win the auction. The example – instead of showing that

⁴⁷ Salant Rebuttal Report ¶ 25 (quotation marks omitted).

⁴⁸ By endogenous market structure we mean that the number of providers will be determined via the competitive bidding process that could have many winners. The number is not pre-determined by the auction rules as would, for an example, an auction that picks exactly two winners.

⁴⁹ Salant Rebuttal Report ¶ 45.

small lower cost providers would be driven out of the market by the auction – shows the opposite: the reverse auction would create greater opportunities and incentives for more efficient providers to grow than the tiered-rate proposals we discussed above.

- 5) ClearCaptions seems not to fully appreciate the incentives in the auction by stating that the “Proposal does not explain why ‘losing’ providers should be barred from serving new customers if they are willing to do so at the price determined by the auction.”⁵⁰ To the contrary, Section 6 of the Auction Proposal explains clearly why winning and losing bidders should not and cannot be treated the same way. If the losing bidders could provide service at the same rate as the winning bidders, every provider would have the incentive to bid very high: in case they are a losing bidder that would have no consequence for their outcome and in case they are the marginal bidder who sets the price, they would strictly benefit from bidding less aggressively. In other words, such a system would result in no competition in the auction.

- a. If not allowing any new customers is considered too strict by the FCC, the auction proposal lists other options for how to treat the losing bidders in the auction and the tradeoffs involved.
- b. ClearCaptions’ discussion of geographic regions suggests another possibility: that losing bidders would be allowed to add new users only in some geographies. We agree that the market is nation-wide and there is no natural geographic market smaller than the entire United States. However, since the service is cloud-based, costs do not drastically change if a losing provider

⁵⁰ ClearCaptions Reverse Auction Talking Points, point 1.b.ii.1.

were limited to adding customers only in some geographies. That could be a way of implementing the possibility discussed in Section 6 of the Auction Proposal, that losing bidders would be allowed to add some new customers, just at a restricted rate.

- 6) We agree with ClearCaptions that the auction should be designed in a way not to force existing customers to switch providers. The Auction Proposal allows losing bidders to provide service to existing customers and puts safeguards to assure incumbents would have the time to react to new rates without disruption of business. We agree with ClearCaptions that the auction should not force existing customers to switch providers.
- 7) ClearCaptions is concerned that the auction would reduce incentives to compete for the users in quality, features, and convenience of the service.⁵¹ The auction would not reduce such pro-competitive incentives. In fact, the auction would force providers to reduce costs and competition will continue. Winning bidders will compete for new users and all bidders will compete for existing users who would be able to switch to better providers.⁵²

As discussed above, tiered rates would be worse than uniform rates for competition in quality, features, and convenience of the service. The reason is that providers with smaller numbers of minutes would have less incentives to grow beyond their current tier. Similarly, if the ranking of the current market shares is correlated with the ranking of quality, features and convenience, then a tiered system would effectively

⁵¹ ClearCaptions Reverse Auction Talking Points, point 1.e.

⁵² In addition, if ClearCaptions is correct that there are economies of scale, it would have strong incentives to add customers and minutes.

provide a smaller revenue per user for providers with higher quality. This perverse incentive could lead to a lowering of quality across the board both because of switches of market shares and because of the altered incentives to compete for customers.

- 8) Finally, ClearCaptions points out differences between other auctions run by the FCC (the Broadcast Incentive Auction and CAF II) and the auction to set rates for the IP CTS.⁵³ Indeed, there are differences, but those differences call for changes in the details of the auction design, and the Auction Proposal takes these differences into account. At the same time there are important similarities: just like in these two other applications, an auction for the IP CTS services would be the right policy to select the efficient service providers and to create the right incentives to service providers. Especially in environments where the regulator has incomplete information about costs (as is the case in IP CTS, in the CAF II auction, and in the Broadcast Incentive Auction), auctions are typically a better policy instrument than other methods for setting rates.

⁵³ ClearCaptions Reverse Auction Talking Points, point 2.

Exhibit 1: CVs

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Director, 2014 - present
Co-Director, 2013-2014
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Stanford Institute for Economic Policy Research
Senior Fellow, 2012-present
Deputy Director, 1999-2016
Senior Research Scholar, 2004-2012
Research Scholar, 1997-2004
Professor of Economics, by courtesy, 2012-present
Lecturer in Economics and Public Policy, 1997- 2012

Federal Communications Commission, Washington, DC
Senior Economist for Transactions, 2011 (part-time while at Stanford)
Deputy Chief Economist, 1995-1997
Acting Chief Economist, Common Carrier Bureau, 1996
Senior Economist, Office of Plans and Policy, 1994-1995

Law and Economics Consulting Group, Berkeley, CA
Senior Economist, 1990-1994

Economists Incorporated, Washington, DC
Economist/Research Associate, 1986-1988

Education

Stanford University, M.A., Ph.D., in Economics, 1986, 1994.
University of California, Berkeley, A.B. in Economics with Honors. 1984.

Papers and Publications

“An Economic Analysis of the Effects of FCC Regulation on Land Mobile Radio,”
unpublished Ph.D. dissertation, Stanford University. 1994.

“Competition in Local Telecommunications: Implications of Unbundling for Antitrust Policy” in Brock, G., (ed.) Toward a Competitive Telecommunication Industry: Selected Papers from the 1994 Telecommunications Policy Research Conference, LEA Associates, Mahwah, NJ. 1995 (with Harris, R. and Teece, D.).

“Competition and 'Local' Communications: Innovation, Entry and Integration,” *Journal of Industrial and Corporate Change*. 1995 (with Teece, D.).

“Spectrum Flexibility will Promote Competition and the Public Interest,” *IEEE Communications Magazine*. December, 1995 pp 2-5. (with Hundt, R.).

“Interconnecting Interoperable Systems: The Regulators' Perspective.” *Information, Infrastructure and Policy*. 1995 (with Katz, M., and Anspacher, J.).

“Everything You Need To Know About Spectrum Auctions, But Didn't Think To Ask,” *Washington Telecom News*, Vol. 4, No. 5. February 5, 1996 p-5. (with Hundt, R.).

The Internet and Telecommunications Policy: Selected Papers from the 1995 Telecommunications Policy Research Conference, LEA Associates, Mahwah, NJ. 1996 (ed. with Brock, G.).

“Introduction,” in Brock, G., and Rosston, G., (ed.s) (1996) The Internet and Telecommunications Policy: Selected Papers from the 1995 Telecommunications Policy Research Conference, LEA Associates, Mahwah, NJ. 1996 (with Brock, G.).

“Competition and ‘Local’ Communications: Innovation, Entry and Integration,” in Noam, E., (ed.) The End of Territoriality in Communications: Globalism and Localism, Elsevier. 1997 (with Teece, D.).

“[Using Market-Based Spectrum Policy to Promote the Public Interest](#),” FCC Staff Paper, 1997. Also published in *Federal Communications Law Journal*, Vol. 50, No. 1. 1997 (with Steinberg, J.).

“A New Spectrum Policy: Letting the Market Work” *Radio Communication Reports*, March 3, 1997, pp 59-64.

“The Telecommunications Act Trilogy,” *Media Law and Policy*. Vol V, No. 2, Winter 1997, pp 1-12.

“Interconnection and Competition Policy,” *Cable TV and New Media*. Vol XV, No. 3, May, 1997, pp 1-4.

“Pricing Principles to Advance Telephone Competition,” *Cable TV and New Media*. Vol XV, No. 4, June, 1997, pp 1-3.

Interconnection and The Internet: Selected Papers from the 1996 Telecommunications Policy Research Conference, LEA Assoc., Mahwah, NJ. 1997 (ed. w/ Waterman, D.).

“Introduction,” in Waterman, D., and Rosston, G., (ed.s) (1997) Interconnection and The Internet: Selected Papers from the 1996 Telecommunications Policy Research Conference, LEA Assoc., Mahwah, NJ. 1997 (with Waterman, D.).

“Comment on the Value of New Services in Telecommunications” *Brookings Papers on Microeconomic Activity--Microeconomics*, 1997.

“Universal Service Reform: An Economist’s Perspective,” *Cable TV and New Media*. Vol XV No. 11, January, 1998, pp 1-4.

“Alternative Paths to Broadband Deployment,” *IEEE Communications Magazine*, July, 1998 pp 2-4. (with Hundt, R.).

“The High Cost of Universal Service,” *CCH Power and Telecom Law*, January-February 1999 (with Wimmer, B.).

“Effects of Unbundling Proposals on Cable Investment Incentives,” *The Party Line, Newsletter of the Communications Industry Committee, American Bar Association Section of Antitrust Law*, March 1999 (with Owen. B.)

“The ABC’s of Universal Service: Arbitrage, Big Bucks and Competition,” *Hastings Law Journal*, Vol. 50, No. 6, August 1999 (with Wimmer, B.).

“An Insiders' View of FCC Spectrum Auctions,” *Journal of Regulatory Economics*, Vol 17, No. 3, 253-289, 2000 (with Kwerel, E.).

“Winners and Losers from the Universal Service Subsidy Battle,” in Vogelsang, I. and Compaine, B. (ed.s) The Internet Upheaval: Raising Questions, Seeking Answers in Communications Policy, Cambridge, MA: MIT Press, 2000 (with Wimmer, B.).

“The Telecommunications Sector” in Kessides, I. (ed.) Hungary: A Regulatory and Structural Review of Selected Infrastructure Sectors, World Bank Technical Paper No. 474, Washington, DC, June 2000.

“The ‘State’ of Universal Service,” *Information, Economics and Policy*, Vol. 12, No. 3. 261-283, September 2000 (with Wimmer, B.).

“From C to Shining C: Competition and Cross-Subsidy in Communications,” in Compaine, B. and Greenstein, S. (ed.s) Communications Policy in Transition: The Internet and Beyond. Selected Papers from the 2000 Telecommunications Policy Research Conference, Cambridge, MA: MIT Press, 2001 (with Wimmer, B.).

“Universal Service, Competition and Economic Growth: The Case of the Hidden Subsidy,” April 2001 in Dossani, R. (ed.) Reforms in the Telecommunications Sector in India, Greenwood Press (with Wimmer, B.).

“The Digital Divide: Definitions, Measurement, and Policy Issues,” in Bridging the Digital Divide, California Council on Science and Technology, May 2001 (with Noll, R., Older-Aguilar, D. and Ross, R.).

“The Long and Winding Road: The FCC Paves the Path with Good Intentions,” *Telecommunications Policy*, Vol. 27, No. 7. 501-515, August 2003.

“Spectrum Allocation and the Internet,” Cyber Policy and Economics in an Internet Age, Lehr W. and Pupillo, L. (ed.s) , Kluwer Academic Publishers, New York, 2002. (with Owen. B.).

“The Economics of the Supreme Court's Decision On Forward Looking Costs,” *Review of Network Economics*, September, 2002 Vol. 1, No. 2, September 2002 (with Noll, R.)

“Local Broadband Access: Primum Non Nocere or Primum Processi? A Property Rights Approach,” in Net Neutrality or Net Neutering: Should Broadband Internet Services be Regulated, Lenard, T. and May, R. (ed.s) Springer: New York, 2006 (with Owen, B.)

“A Losing Battle for All Sides: The Sad State of Spectrum Management” *Federal Communications Law Journal*, Vol. 56 No. 2, March 2004.

Review of *The Second Information Revolution*. by Gerald W. Brock, *Journal of Economic Literature*, Vol. XLII, June, 2004, pp 1157-1158

“Local Telephone Rate Structures Before and After the Act,” *Information, Economics and Policy*, Vol. 17, No. 1. pp 13-34, January 2005 (with Wimmer, B.).

“Communications Policy for 2006 and Beyond” *Federal Communications Law Journal*, Vol. 58 No. 1, 2006 (with Hundt, R.).

“The Effect of Private Interests on Regulated Retail and Wholesale Prices,” *Journal of Law and Economics*, Vol. 51, No 3. August 2008 (with Savage, S. and Wimmer, B.).

“The Rise and Fall of Third-party High-speed Access,” *Information, Economics and Policy* Vol. 21 No. 1 February 2009 pp 21-33.

“Low-Income Demand for Local Telephone Service: Effects of Lifeline and Linkup,” Stanford Institute for Economic Policy Research Discussion Paper No. 07-32 (with Akerberg, D., Riordan, M. and Wimmer, B.)

“An Antitrust Analysis of the Case for Wireless Net Neutrality,” (with Topper, M.) *Information, Economics and Policy* Vol. 22 No. 1, March 2010 pp 103-119.

“Household Demand for Broadband Internet Service in 2010,” *B. E. Journal of Economic Analysis & Policy: Advances*, Vol 10, No 1. August 2010. (with Savage, S. and Waldman, D.).

“The Path to Universal Broadband: Why We Should Grant Low-Income Subsidies and Use Experiments and Auctions to Determine the Specifics,” *The Economists’ Voice*, Vol 8, Iss. 1. 2011. (with Wallsten, S.).

“Using Spectrum Auctions to Enhance Competition in Wireless Services” *Journal of Law and Economics*, November 2011. (with Cramton, P., Kwerel, E. and Skrzypacz, A.).

“Economic Principles for *Ex Ante* Rules for Radio” *Journal on Telecommunications and High Technology Law* Vol 9. No 2. Spring 2011. (with Wallsten, S.).

“Economic and Business Dimensions: Incentive Auctions,” *Communications of the ACM*, 2012, Vol. 55, No. 2.

“The Effect of Network Unbundling on Retail Prices: Evidence from the Telecommunications Act of 1996,” *Journal of Law and Economics*, Vol 56, No. 2. May 2013. (with Savage, S. and Wimmer, B).

“Articulating A Modern Approach to FCC Competition Policy,” *Federal Communications Law Journal*, Vol 66, No. 1. December 2013. (with Hundt, R.).

“The Proposed Merger of AT&T and T-Mobile: Rethinking Possible (2011),” in Kwoka, J. and White, L (eds.) *The Antitrust Revolution*, Sixth Edition, Oxford University Press. 2014. (with DeGraba, P.)

“Increasing Wireless Value: Technology, Spectrum, and Incentives,” *Journal on Telecommunications and High Technology Law*, Vol 12, No. 1, 2014.

“The Broadband Stimulus: A Rural Boondoggle and Missed Opportunity,” *I/S Journal: A Journal of Law and Policy for the Information Society*. Vol 9, No. 3 Winter 2014. (with Wallsten, S.).

“Technological and Regulatory Change in the Communications Industry,” in Payson, S. (ed.) *Public Economics in the United States: How the Federal Government Analyzes and Influences the Economy*, ABC-LIO Press 2014.

“Estimating the Impact of Low-income Universal Service Programs,” *International Journal of Industrial Organization* 37 (2014) 84–98. (with Akerberg, D., DeRemer, D. Riordan, M. and Wimmer, B.).

“Increasing the Efficiency of Spectrum Allocation,” *Review of Industrial Organization*, Volume 45, Issue 3 (2014) 221-243, August 2014.

“Reviewing wireless mergers: providing clarity on how to evaluate competition, efficiency and the ‘public interest’,” *The Antitrust Bulletin*, September 2015, Vol. 60, No 3 pp. 250-267. (with DeGraba, P.)

“Reflecting on the 1996 Act,” *Federal Communications Law Journal*, Vol 68, No. 1. January 2016. (with Wimmer, B.).

“Digital Analogs: Computing, Internet, and Spectrum Lessons for New Space Policy,” *New Space*, Vol. 6, No 1. pp 65- 86, March 2018. (with Hanson, W.).

“Price competition in the market for business telecommunications services,” *Journal of Regulatory Economics*, 54(1), August 2018,
<https://link.springer.com/article/10.1007/s11149-018-9359-9> (with Savage, S. and Wimmer, B).

Policy Briefs and Opinion Pieces

“On the Record: Former FCC Economist Backs Universal Service Alternative,” *Telecommunications Reports*, Vol. 63, No. 51. December 22, 1997, pp 51-53.

“The Future of Wireless,” Stanford Institute for Economic Policy Research *Policy Brief*, May 2001.

“Politics Lands Bush in High Price Lane,” *Los Angeles Times*, June 15, 2001.

“Antitrust Implications of EchoStar-DirecTV Proposed Merger,” Stanford Institute for Economic Policy Research *Policy Brief*, November 2001.

“Supreme Court Decision Regarding the FCC Implementation of the Telecommunications Act of 1996,” Stanford Institute for Economic Policy Research *Policy Brief*, May 2002 (with Noll, R.).

“The FCC Spectrum Policy Task Force Report: A Very Small Step,”

“The FCC and Local Competition,” Stanford Institute for Economic Policy Research *Policy Brief*, April 2003.

“Why Airwaves Should be Deregulated,” *CNET.com*, February 11, 2004 (w/ T. Hazlett).

“Broadband Users, Watch your Wallets,” *CNET.com*, April 27, 2004.

“The Next Phase of the Electronic Highway: Universal Broadband -- Big bucks beyond the vision” *San Francisco Chronicle*, April 30, 2004.

“Cheap Net Phones Face the Threat of a Tax Hangup,” *San Jose Mercury News*, June 17, 2004. (with Hahn, R. and Wallsten, S.)

“Judging the Google IPO,” *CNET.com* August 17, 2004.

“For Whom the Bridge Tolls” *San Francisco Chronicle*, August 27, 2004.

“Writing the Right Ending to the MCI Saga,” *CNET.com* April 5, 2005.

“Traffic Congestion, Congestion Pricing and the Price of Using California’s Freeways,” *SIEPR Policy Brief*, April 2005 (with Flamm, B.).

“Humpty-Dumpty? Competitive Effects of the AT&T – BellSouth Merger,” Stanford Institute for Economic Policy Research *Policy Brief*, March 2006.

“Free Internet access in S.F. not the best deal for consumers,” *San Jose Mercury News*, March 12, 2006.

“The FCC’s 700 MHz Auction,” *SIEPR Policy Brief*, December 2007 (with Andrzej Skrzypacz)

“Quit fooling with wireless-spectrum auction,” *CNET.com*, January 23, 2008

“Testimony of Gregory L. Rosston” at the FCC En Banc Hearing on Broadband Network Management Practices, Stanford University, April 17, 2008

“Saving the digital transition,” *CNET.com*, January 24, 2009 (with Scott Wallsten).

“Using Procurement Auctions to Allocate Broadband Stimulus Grants,” *SIEPR Policy Brief*, May 2009 (with Milgrom, P. and Skrzypacz, A.)

“Fixing Detroit’s Bailout Blues” *CBSNews.com*, May 29, 2009

“The National Broadband Plan,” *SIEPR Policy Brief*, February, 2010.

“Household Demand for Broadband Internet Service,” *Communications of the ACM*, February, 2011 Vol. 54, No. 2. (with Scott Savage and Donald Waldman).

“Competitive Implications of the Proposed Acquisition of T-Mobile by AT&T Mobility” *SIEPR Policy Brief*, March 2011 (with Roger Noll).

“Free markets and rural universal service,” *The Hill*, July 6, 2015. (with Scott Wallsten)

“Moving from Broadcast Television to Mobile Broadband: The FCC’s 2016 Incentive Auction,” SIEPR *Policy Brief*, January 2016 (with Skrzypacz, A.)

“Ten Important Economic Policy Areas for President-elect Trump,” SIEPR *Policy Brief*, November 2016.

Book Review of “The Political Spectrum,” by Thomas Hazlett, *The Wall Street Journal*, July 16, 2017

“Digital Analogs: Computing, Internet, and Spectrum Lessons for New Space Policy,” Report for the Federal Aviation Administration, Office of Commercial Space, Sponsored by Grant 15-C-CST–SU-01, Phase II. (with Ward Hanson) July 19, 2017.

“Net Neutrality: Changing Regulations Won’t Kill the Internet,” SIEPR *Policy Brief*, January 2018.

Other Activities

Editorial/Committees

President’s Council of Advisors on Science and Technology Working Group on Spectrum, 2011-2012.

Department of Commerce Spectrum Management Advisory Committee, Co-Chair, 2011-2014, Member, 2010-2014

Telecommunications Policy Research Conference Board, 2009-2012

Member, Obama Presidential Transition Team, 2008

Co-chair, Obama for President, Economy, Globalization, and Trade Committee, 2008

Associate Editor, *Information, Economics and Policy*, 2008-2010

Referee for various academic journals.

Telecommunications Policy Research Conference, Program Committee 2002-2004.

Bay Area Economic Profile Academic Review Panel, 2003-2004.

National Research Council Committee on *Wireless Technology Prospects and Policy*, 2003-2011

Testimony and Submissions

FCC Economist Panel on the Economics of Interconnection, May, 1996.

FCC Economist Panel on the Economics of RBOC Entry under §271, July, 1996.

FCC Economist Panel on Competitive Bidding for USF, March, 1997.

Consultant for the World Bank on Telecommunications Policy in Hungary, 1998.

FCC Academic Expert Panel on “A New FCC for the 21st Century,” June 1999.

FCC Academic Expert Panel on AT&T—MediaOne Merger, February, 2000.

Principal co-author of 37 Concerned Economists submission on “Promoting Efficient use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets,” February 2001

FCC Panel on Wireless Competition, February 2002.

FCC Workshop on Spectrum Policy, July 2002.

San Francisco Telecom Commission on Cable Competition, January 2003.
U.S. Senate Commerce Committee on Spectrum Policy, March 2003.
California State Senate Committee on Banking, Commerce and International Trade on the Economic Effects of Media Consolidation, March 2003.
San Francisco City Board of Supervisors Land Use Committee on Cable Competition, July 2004.
GAO Panel on Spectrum Allocation and Assignment, August, 2005.
Comments and Reply Comments (with Paul Milgrom) on Auction Rules for Advanced Wireless Services, February 2006
FTC Panel on Network Neutrality, February 2007.
FCC *En Banc* Hearing on Network Management, April 2008.
Principal co-author of 71 Concerned Economists submission on “Using Procurement Auctions to Allocate Broadband Stimulus Grants” Submitted to the National Telecommunications Information Agency (NTIA) and Rural Utilities Service (RUS), April, 2009
FCC Broadband Task Force, Workshop on “Benchmarks” September 2009
U.S. House Commerce Subcommittee on Communications, Technology and the Internet, Universal Service hearings, November 2009
FCC Video Relay Service Reform Workshop, December, 2009
FCC Roundtable on Experiments for Universal Service, 2010
Principal co-author of Letter from 112 Economists to President Obama on Spectrum Auctions and Repurposing Spectrum, April, 2011
FCC Universal Service Reform Workshop, April, 2011

Other

Stanford University

Stanford in Washington Faculty Advisory Committee 2017 – present
Haas Center for Public Service Faculty Steering Committee, 2014 – present
Writing and Rhetoric Review Board, 2014 – 2017
Committee on Review of Undergraduate Majors, 2017 - present

Stanford Federal Credit Union

Board, 2014 – present, Chairman, 2016 – present
Advisory Board, 2012 – 2014

Sustainable Conservation, Advisory Board, 2007 – present

Nepalese Youth Opportunity Fund

Board, 2012 – present, Treasurer, 2016 – present
Advisory Board, 2007-2012

Boards and Advisory Boards for private companies

Awards

Chairman's Distinguished Service Award, FCC, 1997

University of California, Brad King Award for Young Alumni Service, 1994

National Performance Review Hammer Award for Reinventing Government, 1994

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Employment:

Stanford Graduate School of Business 2000-present:
 Theodore J. Kreps Professor of Economics, 2010- present.
 Professor of Economics, 2009-2010.
 Associate Professor of Economics, 2004-2009 (with tenure since 2007).
 Assistant Professor of Economics, 2000-2004.
Stanford University:
 Professor, by courtesy, Department of Economics, Stanford, 2012- present
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Yahoo! Research, 2011 – 2012.
 Academic Visitor

Main Professional Service

Co-Editor of the American Economic Review 2011-2014
Associate Editor for the American Economic Review: Insights 2017 -
Associate Editor for the RAND Journal of Economics. 2008-
Associate Editor for Theoretical Economics. 2009-2011
Associate Editor for the American Economic Review. 2006 -2011

Research

Published and Accepted Papers

1. William Fuchs and Andrzej Skrzypacz (2019) “Costs and Benefits of Dynamic Trading in a Lemons Market.” *Review of Economic Dynamics* 33 (July): 105-127.
2. Dmitry Orlov, Andrzej Skrzypacz and Pavel Zryumov (2019) “Persuading the Regulator to Wait.” Forthcoming in *Journal of Political Economy*.
3. Peter DeMarzo, Ilan Kremer and Andrzej Skrzypacz (2019) “Test Design and Minimum Standards.” *American Economic Review* 109 (6): 2173-2207.
4. Ivan Marinovic, Andrzej Skrzypacz and Felipe Varas (2018) “Dynamic Certification and Reputation for Quality.” *American Economic Journal: Microeconomics* 10 (2): 58-82.
5. Jonathan Levin and Andrzej Skrzypacz (2016) “Properties of the Combinatorial Clock Auction.” *American Economic Review* 106(9) 2528-2551.
Reprinted in Bichler, Martin, and Jacob K. Goeree, eds. *Handbook of Spectrum Auction Design*. Cambridge University Press, 2017.
6. William Fuchs, Aniko Öry and Andrzej Skrzypacz (2016) “Transparency and Distressed Sales under Asymmetric Information.” *Theoretical Economics* 11(3) 1103–1144.
7. Johannes Hörner and Andrzej Skrzypacz (2016) “Selling Information.” *Journal of Political Economy* 124(6) 1515-1562.
8. Simon Board and Andrzej Skrzypacz (2016) “Revenue Management with Forward-Looking Buyers.” *Journal of Political Economy* 124(4) 1046-1087.
9. William Fuchs, and Andrzej Skrzypacz (2015) “Government Interventions in a Dynamic Market with Adverse Selection.” *Journal of Economic Theory* 158, pp. 371-406.
10. Andrzej Skrzypacz and Juuso Toikka (2015) “Mechanisms for Repeated Trade.” *American Economic Journal: Microeconomics*, 7(4), pp. 252-93.
11. Christopher Phelan and Andrzej Skrzypacz (2015) “Recall and Private Monitoring.” *Games and Economic Behavior* 90 (March), pp. 162–17.
12. Maria Bigoni, Marco Casari and Giancarlo Spagnolo and Andrzej Skrzypacz (2015) “Time Horizon and Cooperation in Continuous Time.” *Econometrica*, 83(2), pp. 587-616.

13. Matthew Mitchell and Andrzej Skrzypacz (2015) "A Theory of Market Pioneers, Dynamic Capabilities and Industry Evolution." *Management Science* 61(7), pp.1598-1614.
14. Ilan Guttman, Ilan Kremer and Andrzej Skrzypacz (2014) "Not Only What but also When - A Theory of Dynamic Voluntary Disclosure." *American Economic Review* 104(8), pp. 2400-2420.
15. Qingmin Liu and Andrzej Skrzypacz (2014) "Limited Records and Reputation Bubbles." *Journal of Economic Theory* 151, pp. 2-29.
16. T. Renee Bowen, David M. Kreps and Andrzej Skrzypacz (2013) "Rules With Discretion and Local Information." *Quarterly Journal of Economics* 128(3), pp. 1273-1320.
17. William Fuchs and Andrzej Skrzypacz (2013). "Bargaining with Deadlines and Private Information." *AEJ: Microeconomics*, 5(4), pp. 219-43.
18. Andrzej Skrzypacz (2013) "Auctions with Contingent Payments – an Overview." *International Journal of Industrial Organization* 31(5), pp. 666-675 (Special Issue: Selected Papers, European Association for Research in Industrial Economics 39th Annual Conference, Rome, Italy, September 2-4, 2012)
19. William Fuchs and Andrzej Skrzypacz (2013) "Bridging the Gap: Bargaining with Interdependent Values" *Journal of Economic Theory*, 148(3), pp.1226–1236.
20. Patrick Jordan, Uri Nadav, Kunal Punera, Andrzej Skrzypacz and George Varghese (2012) "Lattice Games and the Economics of Aggregators." Proceedings of the 21st International World Wide Web (WWW 2012).
21. Christopher Phelan and Andrzej Skrzypacz (2012) "Beliefs and Private Monitoring." *Review of Economic Studies*, 79(4), pp. 1637-1660.
22. Peter Cramton, Evan Kwerel, Gregory Rosston and Andrzej Skrzypacz (2011) "Using Spectrum Auctions to Enhance Competition in Wireless Services." *Journal of Law and Economics* 54(4), pp.167-188.
23. Joseph E. Harrington, Jr. and Andrzej Skrzypacz (2011) "Private Monitoring and Communication in Cartels: Explaining Recent Collusive Practices." *American Economic Review* 101(6), pp. 2425–49.
24. Yuliy Sannikov and Andrzej Skrzypacz (2010) "The role of Information in Repeated Games with Frequent Actions." *Econometrica*, 78 (3), pp. 847–882.

25. William Fuchs and Andrzej Skrzypacz (2010) “Bargaining with Arrival of New Traders.” *American Economic Review* 100(3), pp. 802–36.
26. Yuliy Sannikov and Andrzej Skrzypacz (2007) “Impossibility of Collusion under Imperfect Monitoring with Flexible Production.” *American Economic Review*, 97(5) pp. 1794–1823.
27. Joseph E. Harrington, Jr. and Andrzej Skrzypacz (2007) “Collusion under Monitoring of Sales.” *Rand Journal of Economics*, 38 (2) pp. 314 - 331.
28. Ilan Kremer and Andrzej Skrzypacz (2007) “Dynamic Signaling and Market Breakdown.” *Journal of Economic Theory*, 133 (1) pp. 58-82.
29. Matthew Mitchell and Andrzej Skrzypacz (2006) “Network Externalities and Long-Run Market Shares.” *Economic Theory* 29 (3) pp. 621-648.
30. Yossi Feinberg and Andrzej Skrzypacz (2005) “Uncertainty about Uncertainty and Delay in Bargaining.” *Econometrica* 73 (1) pp. 69-91.
31. Peter DeMarzo, Ilan Kremer and Andrzej Skrzypacz (2005) “Bidding with Securities: Auctions and Security Design.” *American Economic Review* 95 (4), pp. 936-959.
32. Jerzy Konieczny and Andrzej Skrzypacz (2005) “Inflation and Price Setting in a Natural Experiment.” *Journal of Monetary Economics* 52(3), pp. 621-632.
33. Andrzej Skrzypacz and Hugo Hopenhayn (2004) “Tacit Collusion in Repeated Auctions.” *Journal of Economic Theory* 114 (1), pp. 153-169.

Working Papers and Work in Progress

34. Yuliy Sannikov and Andrzej Skrzypacz (2017) “Dynamic Trading: Price Inertia and Front-Running.” Stanford GSB working paper No. 3487. (R&R in *American Economic Review*)
35. Felipe Varas, Ivan Marinovic and Andrzej Skrzypacz and (2018) “Random Inspections and Annual Reviews: Optimal Dynamic Monitoring.” (R&R in *Review of Economic Studies*.)
36. Dmitry Orlov, Pavel Zryumov and Andrzej Skrzypacz (2018) “Design of Macro-Prudential Stress Tests.”

Chapters in Books

37. April Franco, Matthew Mitchell, and Andrzej Skrzypacz (2017) "An Economic Theory of Dynamic Capabilities." In "Oxford Handbook on Dynamic Capabilities" Editors: Sunyoung Lee and David J. Teece.
38. Johannes Hörner and Andrzej Skrzypacz (2017) "Learning, Experimentation, and Information Design." In B. Honoré, A. Pakes, M. Piazzesi, & L. Samuelson (Eds.), *Advances in Economics and Econometrics: Eleventh World Congress (Econometric Society Monographs*, pp. 63-98). Cambridge: Cambridge University Press.

Earlier working papers:

39. Ilan Kremer and Andrzej Skrzypacz (2006) "Information Aggregation and the Information Content of Order Statistics."
40. Jerzy Konieczny and Andrzej Skrzypacz (2006) "Search, Costly Price Adjustment and the Frequency of Price Changes – Theory and Evidence."
41. Matthew Mitchell and Andrzej Skrzypacz (2006) "Market Structure and the Direction of Technological Change."
42. Ilan Kremer and Andrzej Skrzypacz (2004). "Auction Selection by an Informed Seller."
43. Andrzej Skrzypacz (2004) "Bargaining under Asymmetric Information and the Hold-up Problem."

Main Non-Refereed Articles, Policy Briefs and Opinion Pieces

44. Gregory Rosston and Andrzej Skrzypacz "- Using Auctions and Flexible-Use Licenses to Maximize the Social Benefits from Spectrum." Submitted to the FCC in September 2017 and prepared on behalf of T-Mobile.
45. Susan Athey and Andrzej Skrzypacz (2017). "Yuliy Sannikov: Winner of the 2016 Clark Medal." *Journal of Economic Perspectives*, 31(2): 237-56.
46. Gregory Rosston and Andrzej Skrzypacz "Moving from Broadcast Television to Mobile Broadband: The FCC's 2016 Incentive Auction," SIEPR Policy Brief, January 2016.
47. Gregory Rosston, and Andrzej Skrzypacz " A Dynamic Market Rule for the Broadcast Incentive Auction: Ensuring Spectrum Limits Do Not Reduce Spectrum Clearance." Submitted to the FCC and prepared for T-Mobile.
48. Paul Milgrom, Gregory Rosston, and Andrzej Skrzypacz "Using Procurement Auctions to Allocate Broadband Stimulus Grants." SIEPR Policy Brief, May 2009.
49. "Comments of 71 Concerned Economists: Using Procurement Auctions to Allocate Broadband Stimulus Grants," organized by Paul Milgrom, Gregory Rosston, Andrzej Skrzypacz, and Scott Wallsten, submitted to NTIA April 13 2009.
50. Andrzej Skrzypacz "Economic Analysis of the Provision Of Roaming Services in the Wireless Service Industry," filed Nov. 30, 2009 at the FCC prepared for T-Mobile.

51. Gregory Rosston and Andrzej Skrzypacz “The FCC’s 700 MHz Auction.” SIEPR Policy Brief , December 2007
52. Peter Cramton, Andrzej Skrzypacz and Robert Wilson “The 700 MHz Spectrum Auction: An Opportunity to Protect Competition In a Consolidating Industry,” submitted to the U.S. Department of Justice, Antitrust Division, 13 November 2007 and prepared for Frontline Wireless, LLC .
53. Peter Cramton, Gregory Rosston, Andrzej Skrzypacz and Robert Wilson “Comments on the FCC’s Proposed Competitive Bidding Procedures for Auction 73,” 31 August 2007 and prepared for Frontline Wireless, LLC.
54. Peter Cramton, Andrzej Skrzypacz and Robert Wilson “Revenues in the 700 MHz Spectrum Auction” Working Paper, University of Maryland, 27 June 2007 and prepared for Frontline Wireless, LLC.

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Honors and Grants

Fellow of the Econometric Society, 2012.

Economic Theory Fellow, Society for the Advancement of Economic Theory (SAET), 2017

Senior Fellow of the RCEA (the Rimini Centre for Economic Analysis) 2018

Fellow of the Accounting and Economics Society 2019

R. Michael Shanahan Faculty Fellow for 2016-2017

GSB Trust Faculty Fellow 2014-15.

Joseph and Laurie Lacob Faculty Fellow for 2012-2013

NSF Grant #1260853 for a research project with William Fuchs “The Negative Effects of High Frequency Trading and Transparency in Dynamic Markets.”

NSF Grant # 0721090 for a research project with Christopher Phelan “Beliefs and Private Monitoring.”

Joseph and Laurie Lacob Faculty Fellow for 2007-2008

Stanford GSB PhD Distinguished Service Award 2005

Best paper award, Utah Winter Finance Conference 2004, joint with Peter DeMarzo and Ilan Kremer for "Bidding with Securities: Auctions and Security Design"

NSF Grant # 0318476 for a research project with Peter DeMarzo and Ilan Kremer “Bidding with Securities - Auctions and Security Design.”

MBA Class of 1969 Faculty Scholar for 2002-2003

APPENDIX C

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554**

DECLARATION OF CHRISTOPHER A. VELLTURO, PH.D.

PREPARED FOR CAPTIONCALL, LLC

SEPTEMBER 19, 2019

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I. OVERVIEW

A. Qualifications/Background

1. My name is Christopher A. Vellturo. I am a microeconomist who specializes in Industrial Organization (the study of how markets operate in regulated and non-regulated settings). I have a Ph.D. in Economics from the Massachusetts Institute of Technology (“MIT”) where I was a Bradley Fellow in public economics. My dissertation and a number of my subsequent professional publications focused on the economic efficiency and competitive implications of the partial deregulation of the U.S. Rail Freight Industry. I attach my current curriculum vitae as Appendix 1 to this declaration.
2. I have taught economics to undergraduates at MIT and MBA students at the Questrom School of Business at Boston University. I am the founder and president of Quantitative Economics Solutions, a microeconomic consulting firm in Boston, MA. As an economic consultant, I have testified/appeared before the U.S. Congress, the Federal Reserve Board of Governors, the U.S. Department of Justice, the Federal Trade Commission, and various state attorneys general. I have also appeared at various regulatory agencies around the world, including the European Commission, and antitrust enforcement agencies in Canada, Australia, and New Zealand.
3. A central area of focus of my professional career has related to intellectual property. I have designed numerous licensing programs for owners of IP (including patents, trade secrets, and copyrights). I have served as a special master in arbitration proceedings where intellectual property developed by joint ventures were valued as part of the ventures’ dissolution and asset dispersal. I have also studied and assessed “reasonable royalty” based damages in more than 150 patent litigations in the United States, Europe, and Canada. In this context, I have studied numerous industries, including the telecommunications industry. I was the central damages-related witness for Apple Inc. in the extended “smartphone wars” between Apple and Samsung.

B. Assignment and Summary of Findings

4. I have been retained by counsel for CaptionCall, LLC to apply my expertise as an economist and specialist in the economics of intellectual property to study the Federal Communications Commission's ("Commission") potential treatment of innovation expenses – expenses associated with research and development ("R&D") and intellectual property ("IP") licensing – in an allowable cost framework that may be used to set compensation rates for providers of internet protocol captioned telephone services ("IP CTS").
5. The Commission, in considering moving away from a market-based rate-setting methodology using the Multistate Average Rate Structure (the MARS plan) to one based on allowable costs, has proposed treating innovation expenses differently between providers that license IP from third parties and vertically-integrated providers that pay an affiliate for the use of IP, allowing recovery of IP licensing costs for the former but not the latter.
6. I have been asked to consider the impact of this proposed differential treatment on providers' incentives to innovate and on the provision of IP CTS more generally, and – in the event it moves to an allowable-cost-based framework – to suggest ways for the Commission to treat innovation costs going forward in a manner that helps preserve economic efficiency and incentives to innovate.¹
7. By way of background, innovation efforts and the development of proprietary intellectual property are cornerstones of the U.S. economy generally and are particularly central to the IP CTS industry, where advances in connectivity, computer processing power, and storage have provided opportunities to improve IP CTS for those with hearing loss.
8. In its early stages, certain providers in the IP CTS industry relied heavily on intellectual property disseminated by Ultratec, a company that licensed (and continues to license) its IP to IP CTS providers (including Hamilton Relay and Sprint) in exchange for royalties

¹ The documents that I relied upon are identified in the footnotes to this Declaration.

paid out of providers' revenues. By contrast, CaptionCall has always been a vertically-integrated innovator and provider that has chosen to fund R&D instead of licensing others' innovations, and has used the intellectual property it has developed in the dissemination of its IP CTS. To quantify the inherent market value of its innovations in a way parallel to royalty fees for outsourced innovation, I understand CaptionCall has put in place a standard organizational structure under which royalties are transferred between its innovation and IP CTS provider businesses, and has established the level of royalties by, *inter alia*, commissioning an independent, expert transfer pricing study.

9. In recent years, CaptionCall has become the leading innovator in IP CTS, as demonstrated through a study of patents issued in the IP CTS space (*see infra* Section III.C).
10. As noted above, the Commission is considering moving from a market-based rate-setting methodology to a methodology based on allowable costs. Further, within the construct of an allowable-cost-based framework, the Commission has preliminarily indicated that the innovation expenses of providers may be treated differently depending on whether the innovator and provider are unaffiliated entities – in which case licensing fees associated with innovation would be included in the cost base on an ongoing basis – or are affiliates within a single, vertically-integrated entity – in which case the licensing fees associated with innovation would not be included in the cost base.² The Commission has sought comment on this proposal,³ and thus I have examined it in terms of its potential effects on economic efficiency and innovation in IP CTS.
11. Relatedly, I have been asked to propose alternative structures that may help mitigate any distortions associated with the proposed framework.
12. Based on my analysis, I have concluded that differential treatment of vertically-integrated providers (like, but not limited to, CaptionCall) from providers that choose to license IP

² *In re Misuse of Internet Protocol (IP) Captioned Telephone Service*, Report and Order, Declaratory Ruling, Further Notice of Proposed Rulemaking, and Notice of Inquiry, 33 FCC Rcd 5800, 5821-22 ¶ 35 (2018) (“2018 Order and Further Notice”).

³ 2018 Order and Further Notice, 33 FCC Rcd at 5838-40 ¶¶ 74-76.

from third parties will result in arbitrary and material distortions that will significantly impede optimal innovation in IP CTS. At its heart, this distortion arises because, while non-vertically-integrated providers will retain the ability to pay potentially unlimited royalties to use third-party innovations, vertically-integrated firms will have no mechanism by which to earn returns on their innovations commensurate with the value the innovation brings to the market, and will thus have less incentive to innovate optimally. Economic intuition serves as a guide to what is amiss here – non-vertically-integrated innovators will earn royalties based on the output of their innovative efforts (*i.e.*, the value of the innovations they successfully develop), just as innovators are in unregulated settings, while vertically-integrated innovators/providers will have their compensated costs weighted towards the level of inputs (*i.e.*, R&D spend) that they undertake, and much less towards the actual value of the innovations they may develop.

13. The distortions would be particularly problematic for the provision of IP CTS and thus for consumers, because (vertically-integrated) CaptionCall is the most prolific innovator in the IP CTS market and has demonstrated a repeated ability to create and bring to market important innovations to IP CTS.
14. Of course, a market-based compensation rate that is *not* tied to reported costs – such as a price-cap based regulation or auction-based provider competition – is inherently immune from such distortions, as it would rely upon traditional market forces and innovation decisions to determine the level of innovative effort.
15. But, if the Commission opts to move to an allowable cost framework, the only way to maintain basic equity and avoid distortion is to allow the recovery of IP licensing fees whether the company is vertically integrated or not, for existing intellectual property and future innovation.
16. Moreover, one way of ensuring that innovation expenses are treated equitably for all providers is to allow for the recovery of IP licensing fees for both vertically-integrated and non-vertically-integrated firms, but, at the same time, not allow R&D costs to be included in the allowable cost base going forward. This would address any potential concern from

the Commission that IP costs incurred by vertically-integrated innovators/providers are already being captured through reimbursement for R&D, because R&D would not be included in the allowable cost base. That said, the Commission cannot exclude both R&D and IP licensing fees, as that would be contrary to the clear mandate of the Americans with Disabilities Act, namely, that any Telecommunications Relay Service (“TRS”) regulation must encourage the development of improved technology.⁴

17. In sum, compensating IP licensing fees on an equal footing – whether they are transfer fees or third-party licensing fees – is a standard approach used across a variety of industries. Because the IP CTS space has a number of providers and is a competitive market, the Commission should be able to ensure comparable market-based royalty fees among providers, provided that costs are treated on an apples-to-apples basis across business models.

II. THE ROLE OF INNOVATION AND THE DEVELOPMENT OF INTELLECTUAL PROPERTY IN IP CTS

A. The Role of Innovation in Economic Efficiency

18. There is widespread agreement among economists that innovation is a central driver of economic growth and consumer welfare enhancement, and provides the foundation of new products, processes, and methods.⁵ Indeed, as stated in a 2015 Organization for Economic Cooperation and Development (“OECD”) paper, multifactor productivity (“MFP”) – which is a common innovation metric used by economists⁶ – accounted for

⁴ See 47 U.S.C. § 225(d)(2).

⁵ See, e.g., *The Global Innovation Index (GII) 2019: Creating Healthy Lives—The Future of Medical Innovation* (2019), <https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII2019-keyfindings-Web.pdf>.

⁶ See, e.g., Bronwyn H. Hall, *Using Productivity Growth as an Innovation Indicator* (Oct. 2011), https://eml.berkeley.edu/~bhhall/papers/BHH11_EC_DGR_prod_innov_Oct.pdf.

about one-third of total GDP growth between 1995 and 2013 on a worldwide basis,⁷ and for nearly half of total GDP growth in the U.S.⁸

19. As one of the world's top innovation leaders, the U.S. has experienced a significant increase in innovation over the past decades, sustaining an average annual growth of 8.5 percent,⁹ measured by utility patents issued.¹⁰ Notably, much of this innovation activity has taken place in Computer & Electronics,¹¹ the sector in which IP CTS-related patents fall.¹² As shown in Figure 1 below, there has been a significant increase in innovation since 2000, and the Computer & Electronics sector accounted for almost 60 percent of all U.S. utility patents issued by 2014.

⁷ *The Innovation Imperative, Contributing to Productivity, Growth and Well-Being*, 17-18 OECD (2015), <https://dx.doi.org/10.1787/9789264239814-en>.

⁸ *OECD Compendium of Productivity Indicators 2015*, Chapter 1 Figure 1.13 *Contributions to GDP growth* OECD (2015), <https://dx.doi.org/10.1787/pdtvy-2015-en>; <http://dx.doi.org/10.1787/888933203463>. *Calculations taken from underlying OECD data*, <http://dx.doi.org/10.1787/888933203463>; Between 1995 and 2013, “Labour input,” “ICT capital,” “Non-ICT capital,” and “Multifactor productivity” (“MPF”) accounted for 9.47, 7.16, 10.76, and 14.51 percentage points of GDP growth respectively. MPF contributed to approximately 1/3 of total growth worldwide ($14.51 / (9.47 + 7.16 + 10.76 + 14.51) = 0.35$). For the same time period in the U.S., the four components accounted for 0.42, 0.44, 0.42, and 1.11 percentage points of annual GDP growth respectively. For the U.S., MPF contributed to nearly half of annual GDP growth ($1.11 / (0.42 + 0.44 + 0.42 + 1.11) = 0.46$).

⁹ See Appendix 3.

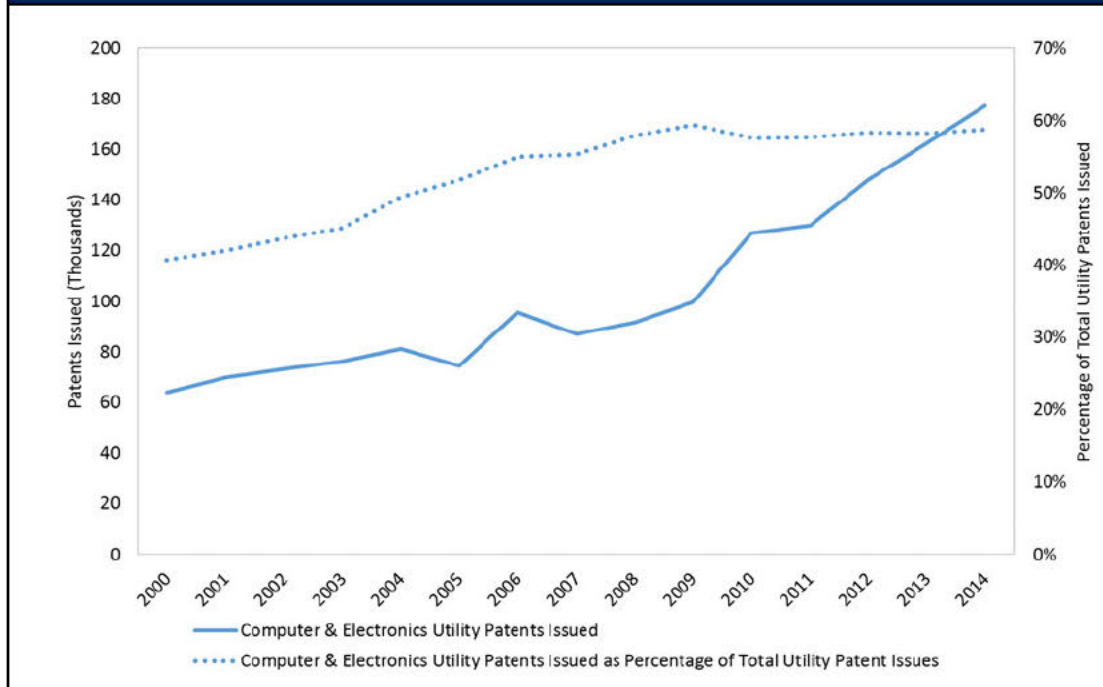
¹⁰ Utility patents are patents granted to an entity or individual who invents or discovers any new and useful process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof. Utility patents account for the majority of the patents granted by the USPTO. See U.S. Patent and Trademark Office, Nonprovisional (Utility) Patent Application Filing Guide (last visited Sept. 17, 2019), <https://www.uspto.gov/patents-getting-started/patent-basics/types-patent-applications/nonprovisional-utility-patent#heading-2>.

¹¹ Computer & Electronics refers to the combination of the patent sub-categories of Computer & Communications and Electrical & Electronic, defined in the National Bureau of Economic Research, *The NBER U.S. Patent Citation Data File* (last updated May 16, 2012) <https://www.nber.org/patents/>.

¹² The NBER categories associated with IP CTS-related patents were determined based on the mapping between U.S. Patent Classification (“USPC”) and NBER technology categories developed by Alan C. Marco *et al.*, *The USPTO Historical Patent Data Files: Two Centuries of Innovation*, (USPTO Economic, Working Paper No. 2015-1, June 2015, https://www.uspto.gov/sites/default/files/documents/USPTO_economic_WP_2015-01_v2.pdf).

Figure 1: U.S. Utility Patents Issued – Computer & Electronics Sector

Source: Appendix 4



B. Incentives to Secure and Disseminate Intellectual Property

20. From an economic perspective, the underlying determination of a firm's innovation effort and investment, like its investment in other economic inputs such as labor or capital, is a rational decision governed by the principle of profit maximization.¹³ That is, firms have incentives to conduct R&D to the extent R&D generates assets that firms can deploy that are difficult to duplicate.¹⁴ As such, legislation and public policy seeking to encourage innovation should be in place both to protect innovation from infringement, but also to allow the innovative firms to recoup their substantial investments and to earn profits that incentivize further investment in innovation.
21. In the United States, intellectual property protection is grounded in the U.S. Constitution, which includes as a stated goal: “[t]o promote the [p]rogress of [s]cience and useful [a]rts,

¹³ See, e.g., Hal R. Varian, W.W. Norton & Company, *Intermediate Microeconomics: A Modern Approach*, 345-46 (2010).

¹⁴ See, e.g., Hal R. Varian, W.W. Norton & Company, *Intermediate Microeconomics: A Modern Approach*, 449 (2010).

by securing for limited [t]imes to [a]uthors and [i]nventors the exclusive [r]ight to their respective [w]ritings and [d]iscoveries.” Emanating from this constitutional mandate, U.S. patent law grants a utility patent a 20-year term (15-year term for a design patent) of exclusive commercial rights from the earliest patent application filing date.¹⁵ Such exclusive rights offer firms not only appropriate protection from infringement, but also the opportunity to earn a reasonable financial return for the R&D programs they have undertaken.

22. First, these rights create some insulation from competition by excluding imitators for the period of patent protection, thus allowing firms that elect to keep their intellectual property for proprietary use to set prices above marginal costs and/or expand demand for their products. In this sense, intellectual property generates an inherent value. Second, these rights allow firms to earn returns on their R&D investments by licensing their intellectual property to others in exchange for royalties.¹⁶ As a result, the U.S. patent system (as an example) provides economic incentives for firms to engage in R&D programs likely to yield more innovations. These economic rewards for innovation are commonly medium-to-long term in nature, unlike those associated with many firm activities intended to yield short-term profits.¹⁷ In this sense, maintaining strong incentives for firms to invest in R&D programs targeting innovation encourages firms to take risks that lead to consumer benefits and/or overall cost savings.

¹⁵ See *Appendix L Consolidated Patent Laws – April 2019 update*, § 35 U.S.C. 154 (a)(2) and § 35 U.S.C. 173 (2019), https://www.uspto.gov/web/offices/pac/mpep/consolidated_laws.pdf.

¹⁶ Richard Gilbert & Alan Weinschel, *Competition Policy for Intellectual Property: Balancing Competition and Reward*, in III *Issues in Competition Law and Policy* (2008).

¹⁷ In fact, investors that are short-term oriented often favor activities that have a more certain and shorter payback period *i.e.*, advertising, over longer-term activities such as R&D. See Surinder Tikoo & Ahmed Ebrahim, *Financial Markets and Marketing the Tradeoff between R&D and Advertising During an Economic Downturn*, 50 J. Advert. Research, 4 (2010).

C. Significance of Innovation in IP CTS

23. Innovation has been critical to IP CTS since its introduction in 2006.¹⁸ The Commission has repeatedly acknowledged the contributions of these innovations to both cost reduction and user experience improvement. For example, the Commission’s IP CTS website states that “IP CTS allows persons with hearing loss to take advantage of advancements in communication technologies ... to more effectively use the telephone in their jobs.”¹⁹ In its 2007 Order, the Commission recognized that, “because [IP CTS] service offers consumers additional features – *e.g.*, portability, lower cost and easier availability, greater accessibility for persons with multiple disabilities – it represents an important step towards functional equivalency”²⁰ with respect to the communication services for people without such disabilities. Furthermore, in the most recent 2018 Order and Further Notice, the Commission observed that there has been greater usage of IP CTS over other forms of TRS and identified “[the] convenience of using IP CTS, including the absence of direct interaction between the parties to the call and the CA” as one of the reasons.²¹
24. In fact, there is an explicit congressional directive to encourage innovation in IP CTS, as acknowledged by the Commission in its 2018 Order and Further Notice: “[S]ection 225(d)(2) directs the Commission to ensure that TRS regulations ‘encourage ... the use of existing technology and do not discourage or impair the development of improved technology.’”²² Consistent with that mandate, and as clearly stated in the recent orders by the Commission, the law encourages “all IP CTS providers to offer consumers as many ... features as possible”²³ and rejects “any notion that the captions need to be ‘generated by

¹⁸ Ultratec, *Technology Timeline*, <http://www.ultratec.com/about/timeline/> (last visited Sept. 18, 2019).

¹⁹ FCC, *Internet Protocol (IP) Captioned Telephone Service* (last updated Sept. 8, 2017), <https://www.fcc.gov/consumers/guides/internet-protocol-ip-captioned-telephone-service>.

²⁰ *In re Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities Internet-Based Captioned Telephone Service*, Declaratory Ruling, 22 FCC Rcd 379, 389 ¶ 23 (2007) (“2007 Order”).

²¹ 2018 Order and Further Notice, 33 FCC Rcd at 5805 ¶ 9.

²² 2018 Order and Further Notice, 33 FCC Rcd at 5831-32 ¶ 58 (quoting 47 U.S.C. § 225 (d)(2)).

²³ 2007 Order, 22 FCC Rcd at 393 ¶ 31.

voice recognition technology or any other particular way.”²⁴ Looking forward, the Commission seeks to “allow [the IP CTS] program to evolve as technological changes are adopted in the telecommunications industry.”²⁵

25. In addition to the Commission’s explicit encouragement of innovation, growing consumer demand also drives innovation in the IP CTS space. In the 2018 Order and Further Notice, the Commission has recognized that the population of people with hearing loss has and will continue to grow.²⁶ Thus, improvements in IP CTS with respect to cost efficiency and user experience driven by innovation are likely to continue moving forward, particularly as the industry further develops Automated Speech Recognition (ASR) technologies and applies them to IP CTS, thus helping more people who suffer from hearing loss use the telephone in a manner that is functionally equivalent.

III. DISTORTIONARY IMPACT OF TREATING INNOVATION EXPENSES DIFFERENTLY FOR THE PURPOSES OF SETTING IP CTS RATES

A. Overview

26. As noted earlier, in the 2018 Order and Further Notice, the Commission sought comment on how to treat innovation expenses (R&D expenses and IP royalties paid) in the context of a rate-setting methodology that determines rates for IP CTS providers based on “allowable cost” reimbursement plus a prescribed return (or margin) applied to the allowable cost reimbursement base (“ACRB”) to arrive at a per-minute IP CTS provider compensation rate.²⁷ The Commission has proposed that, in the event it moves to this allowable cost framework as its rate-setting mechanism, innovation expenses relating to IP CTS equipment would not be included in the ACRB. With respect to IP CTS service-related innovation expenses, the Commission has indicated that it may limit innovation expenses in the ACRB to allowable R&D expenditures and royalties paid by providers for

²⁴ 2018 Order and Further Notice, 33 FCC Rcd at 5830 ¶ 54.

²⁵ 2018 Order and Further Notice, 33 FCC Rcd at 5868 ¶ 155.

²⁶ 2018 Order and Further Notice, 33 FCC Rcd at 5806 ¶ 12.

²⁷ 2018 Order and Further Notice, 33 FCC Rcd at 5836-40 ¶¶ 70-76.

access to third-party intellectual property, but that it would not include in the ACRB a royalty associated with intellectual property developed or held by providers or their affiliates who are vertically integrated, thereby limiting such vertically-integrated firms to the inclusion of future allowable R&D expenses incurred in the ACRB.

27. As I demonstrate in this section, this disparate treatment of intellectual property would lead to a material imbalance in the incentives for providers to innovate in IP CTS. In particular, while third-party innovators would be free to collect (allowable but potentially unlimited) royalties from licensed providers, the regime would place limitations on the return that vertically-integrated innovators can earn on their past innovation efforts, thus significantly limiting their compensation to the costs of R&D incurred plus the profit margin addition in the ACRB-based compensation mechanism, instead of allowing them to earn a return commensurate with the magnitude of the value/benefit conferred by the innovation as reflected in a royalty directly related to the intellectual property's value in the market. This non-uniform treatment leaves vertically-integrated innovators with relatively less incentive to innovate optimally than third-party innovators that license their innovations to IP CTS providers.
28. As also discussed herein, this distortion is likely to produce significant welfare losses and inefficiencies in the provision of IP CTS, since this differential treatment of innovation expenses will create an incentive imbalance between innovators that is merely a function of their organizational structures. Third-party licensors, such as Ultratec, will have the latitude to negotiate and collect market rate royalties on its innovations, which its licensees will then be allowed to include in the ACRB throughout the proprietary life of the innovation. By contrast, a vertically-integrated innovator, such as CaptionCall, will be limited to the one-time inclusion in its ACRB of the R&D expenses (to the extent it is allowed), incurred as a result of its innovative efforts rather than the market value of the innovation developed. This distortion will lead to an unlevel playing field in IP CTS innovation, with its attendant economic distortion in competition in innovation among rival firms.

B. Economic Depiction of the Distortion Produced by the Differential Treatment of Innovation Expenses in the Proposed Allowable-Cost-Based Compensation Mechanism for IP CTS

29. The distortion associated with the differential treatment of innovation expenses among vertically-integrated and non-vertically-integrated innovators/providers arises in the current proposed setting because the mechanisms by which the two sets of market participants can earn returns on their innovations are markedly different. While non-vertically-integrated innovators can earn market-determined royalties for their innovations (and licensees can include such royalties in their ACRBs), vertically-integrated innovators cannot – their return to innovation is skewed away from the value of innovations developed.
30. To see how this distortion arises, I consider a stylized example of an IP CTS innovation and how the returns to such innovation are materially higher for non-vertically-integrated industry participants than those that are available to IP CTS firms that are vertically integrated. Initially, I consider these dynamics under an assumed compensation rate mechanism where a single rate is determined for all providers (“uniform rates”); as I demonstrate later, the distortions that arise under uniform rates only worsen should tier-based compensation rates be implemented. The discussion here is heuristic in nature; in Appendix 2, I provide a more formal economic model that lays out the nature of the distortions that arise.
31. As a firm that cannot directly exploit its innovation in the provision of IP CTS, the non-vertically-integrated innovator seeks to earn a financial return on its intellectual property by licensing it to IP CTS providers. As currently contemplated by the Commission, there are no limits placed on the royalty that can be agreed upon in this setting – thus the rate will be determined through a negotiation between the licensor and the IP CTS provider licensee as to how the benefit (or economic surplus) of the innovation as deployed in IP CTS will be divided between licensor and licensee. This, of course, is the common market mechanism by which royalties are arrived at for intellectual property in non-regulated

market settings.²⁸ The innovator's return takes the form of the royalty paid; the surplus retained by the licensee includes the difference between the value of the innovation in its application to IP CTS and the royalty it pays for access to the innovation. Note that a portion of the royalty paid by the IP CTS provider is recouped through the rate-setting mechanism, as the royalty rate is included in the ACRB, and thus the IP CTS provider would see its reimbursement rate rise as a result of the royalty paid by its share of industry IP CTS minutes delivered times the royalty rate.²⁹ In this setting, the innovator receives a negotiated royalty, and the non-vertically-integrated service provider receives the difference in the value of the innovation to its business and the royalty paid, plus a partial recoupment of the royalty amount through the inclusion of the royalty in its allowable cost. Combined, the two firms earn the value of the innovation (the innovator earns the royalty and the service provider earns the value of the innovation with respect to IP CTS less the royalty paid, *plus* the partial recoupment of royalties paid through the rate-setting mechanism). Importantly, these returns are realized by the non-vertically-integrated innovator and the IP CTS provider year after year, for so long as the license to the innovation remains active.

32. The returns from innovation look very different under the proposed structure for the vertically-integrated innovator/provider. While the vertically-integrated innovator/provider can earn the benefits of its innovation by applying its innovation in its IP CTS operations directly, under the current proposal, its provider business "pays" no royalty, so there is no recoupment of any ongoing royalty obligation through the allowable cost mechanism. Instead, the vertically-integrated firm's return is truncated to a one-time

²⁸ I note that occasions do arise in which a patentee and its potential licensees are unable to reach a mutually acceptable license agreement. In such instances, the parties may resort to legal processes to resolve certain disputes.

²⁹ As detailed in Appendix 2, in a uniform setting, the royalty paid by a single provider on its minutes served goes into the overall ACRB, along with the costs of others. The overall rate increases to reflect the royalty paid, but the added royalty cost only applies to the licensee's minutes, while the compensation rate reflects a single rate derived from the overall costs of all providers divided by the service minutes of all providers.

recoupment of its R&D expenses associated with the innovation (plus the prescribed return).

33. I note that this distortion applies broadly across all forms of innovation, but the distortion is particularly acute in innovations that generate marginal cost reductions in the provision of IP CTS. This is because the benefits of an innovation that reduces marginal costs also results in a reduction in the ACRB and an associated decline in the compensation rate. In the non-vertically-integrated setting, the degree of this decline in the rate is tempered by the increase in the ACRB associated with the royalty paid by the third-party provider to the third-party innovator. For the vertically-integrated innovator/provider, no such royalty is factored into the ACRB for the provider, thus, the available return for the vertically-integrated firm (considered carefully by following the implications of the proposed mechanism) is materially lower than for the non-vertically-integrated firms. The result would be an unlevel competitive playing field and the associated diminution in competition among innovative rivals in IP CTS. Of course, this distortion in incentives between vertically-integrated and non-vertically-integrated firms – and the general distortion that arises from the disincentive associated with allowable-cost-based rate setting’s dampening effect on incentives to reduce costs for all innovators/providers – can be averted by maintaining a market-based approach rather than moving to an allowable-cost-based model.
34. As noted earlier, this distortion worsens considerably with tiered rates that explicitly or implicitly vary each provider’s compensation based on each provider’s costs. A further consideration of the marginal cost-reducing innovation of the previous paragraph starkly demonstrates this worsening distortion. With tiered rates, providers receive specific compensation rates under the mechanism tied to changes in their own costs (not in overall average industry costs). For the non-vertically-integrated IP CTS provider, their costs decline by the net difference between the marginal cost savings (a cost reduction) and the royalty it pays (a cost increase). Thus, the royalty effectively migrates out of the regulatory system, and remains as a return to the non-vertically-integrated, non-regulated innovator. Indeed, as discussed in the next section, this mechanism creates incentives for

opportunistic setting of artificially high royalties that can be used to subvert the passing of “net” cost savings through the ACRB and into a lower compensation rate.

35. For the vertically-integrated innovator/provider, there is no royalty mechanism by which any of the surplus generated by the innovation remains as a return for the innovator/provider, as the full savings of the innovation directly goes into the ACRB, and the specific compensation rate applied to this provider reflects the full decline in marginal costs (which is starkly different from the savings-net-of-royalty effect in the non-vertically-integrated setting). The only compensation effectively available to the vertically-integrated innovator/provider in this setting is the one-time recoupment of its allowable R&D expenses in the ACRB (plus the prescribed return). As such, in the tiered-rate setting, the incentives for vertically-integrated firms to innovate are sharply reduced, while non-vertically-integrated firms retain their incentive to innovate, as they can effectively extract value from regulatory oversight through the royalty.

C. Impact on IP CTS Innovation

36. As discussed above in Section III.B, the potential differential treatment of innovation expenses associated with non-vertically-integrated providers and vertically-integrated innovators/providers will result in distortions that would likely materially impede optimal innovation. Such distortions would be particularly problematic in the IP CTS industry, where the two principal patent owners have different organizational structures. Namely, Ultratec – which, because it is not a certified provider, is not subject to the Commission’s rules – has licensed its intellectual property to multiple IP CTS providers, while CaptionCall – as a vertically-integrated innovator/provider – has used its own intellectual property in the dissemination of its own IP CTS. In this section, I discuss the structure of the historical market for IP CTS innovation, and the distortions likely to be caused by the current proposal.

37. In the early stages of IP CTS, Ultratec licensed its intellectual property to other IP CTS providers including Hamilton Relay and Sprint in exchange for royalties.³⁰ When CTS was first authorized in 2003, the Commission recognized that the service was offered solely by Ultratec.³¹ In authorizing IP CTS in 2007, the Commission “continued to express concern about the consequences of a single company having control of CTS technology.”³² Stating that IP CTS would “not be a service under the control of one vendor or provider,” the Commission conditioned its approval of IP CTS on “Ultratec’s representation that it will continue to license its captioned telephone technologies, including technologies to IP CTS, at reasonable rates.”³³
38. In recent years, Ultratec’s intellectual property generation (to the extent its patents remain valid) has fallen behind that of other IP CTS innovators. Over 55 percent of Ultratec’s granted IP CTS-related patents will have expired by 2019, and about another 17 percent are set to expire in the next five years.³⁴ Meanwhile, CaptionCall has become the leading innovator in the IP CTS market. As shown in Figure 2 below, there has been a sharp acceleration in CaptionCall’s IP CTS innovation over the past five years measured by patents issued.³⁵ In fact, CaptionCall’s patents issued have grown at a compound annual

³⁰ See Request for Comment on Petition Filed by Sorenson Communications, Inc. and CaptionCall, LLC, Regarding Licensing of Internet Protocol Captioned Telephone Service Technology, Public Notice, CG Docket Nos. 03-123 & 13-24, 29 FCC Rcd 14,359 (Nov. 25, 2014). I understand that Ultratec provides a range of wholesale services and receives payments, including but not limited to payments for IP licenses. See Comments of Ultratec, Inc. and Captel, Inc. on Petition Filed by Sorenson Communications, Inc. and CaptionCall, LLC Regarding Licensing of Internet Protocol Captioned Telephone Service, CG Docket Nos. 03-123 & 13-24 (filed Dec. 29, 2014). It does not make a difference to the nature of the distortion analysis whether Ultratec or any other IP rights holder receives payments for those rights on an itemized basis or as part of a broader transaction. In either case, the IP rights holder is capturing value for those rights.

³¹ 2018 Order and Further Notice, 33 FCC Rcd at 5838-39 ¶ 74.

³² 2018 Order and Further Notice, 33 FCC Rcd at 5838-39 ¶ 74 (quotation marks omitted).

³³ 2007 Order, 22 FCC Rcd at 389 ¶ 24.

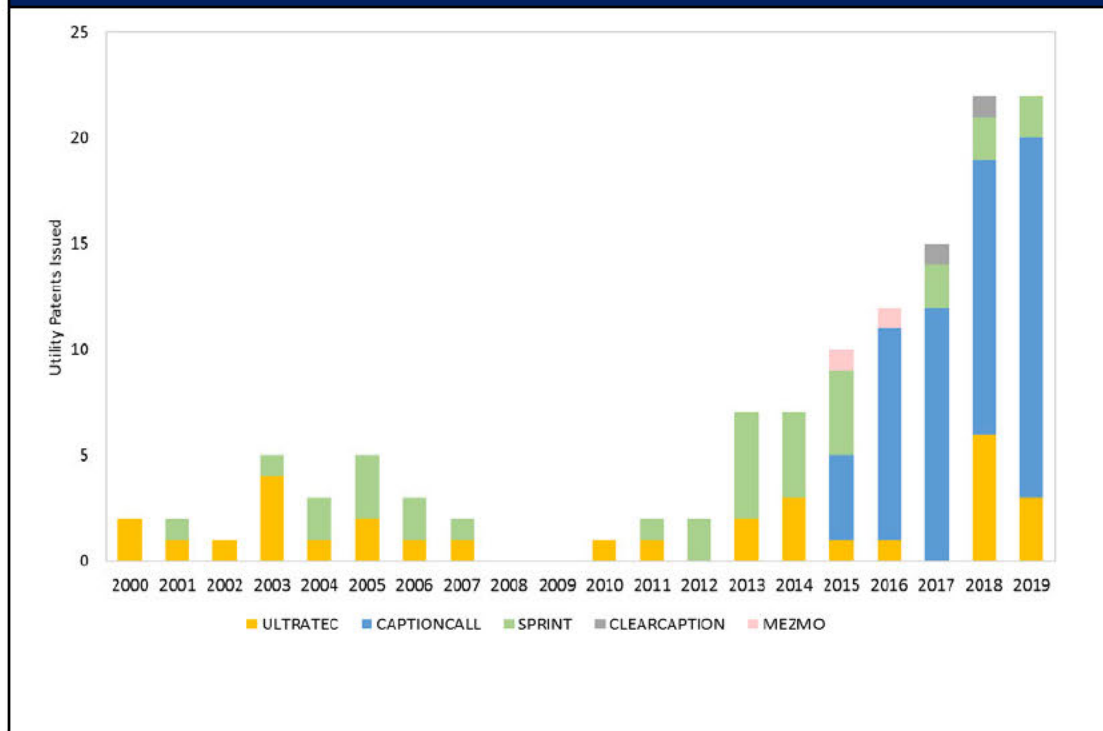
³⁴ See Appendix 6.

³⁵ A granted patent with a unique patent number is counted as a patent issued. Based on my understanding from CaptionCall’s patent counsel, I exclude from my analysis any patents associated with CaptionCall and Ultratec that were ruled as either invalid or unpatentable by courts or the USPTO. Because I have counted patents in this manner, without substantive evaluation of the patents, nothing herein reflects an opinion on whether particular patents are valid or enforceable.

growth rate of 44 percent based on utility patents.³⁶ As shown, these innovations by CaptionCall account for the vast majority of the recent innovation activity in the IP CTS industry.³⁷ Note that Figure 2 captures only the patents that have been granted in the past, and thus does not reflect the ongoing innovation effort CaptionCall continues to undertake in IP CTS.

Figure 2: U.S. IP CTS Related Utility Patents Issued by IP CTS Firm

Source: Appendix 5



³⁶ The compound annual growth rate is calculated as the number of utility patents granted to CaptionCall in 2019 divided by that of 2015, raising the result to the exponent of one-fourth, and then subtracting one from the sequent result.

³⁷ In constructing the underlying patent data, I compiled a list of utility patents granted to IP CTS providers and filtered the list using IP CTS-related keywords such as “caption,” “transcription,” “TTY,” “TDD,” “audiogram,” “hearing loss,” “deaf,” “voice over internet.” I also excluded any VRS-related patents by removing patents that contain either “video relay” or “video communication” in its description. I did not find any patents granted to Hamilton Relay. I further refined the patents for CaptionCall and Ultratec after consulting with CaptionCall’s patent counsel. I note that this approach sustains the possibility of overcounting competitors’ patents and thus likely understates CaptionCall’s innovation position among competitors. To be conservative, I include all utility patents granted to ClearCaptions and Mezmo, regardless of whether the patent contains the IP CTS associated keywords above.

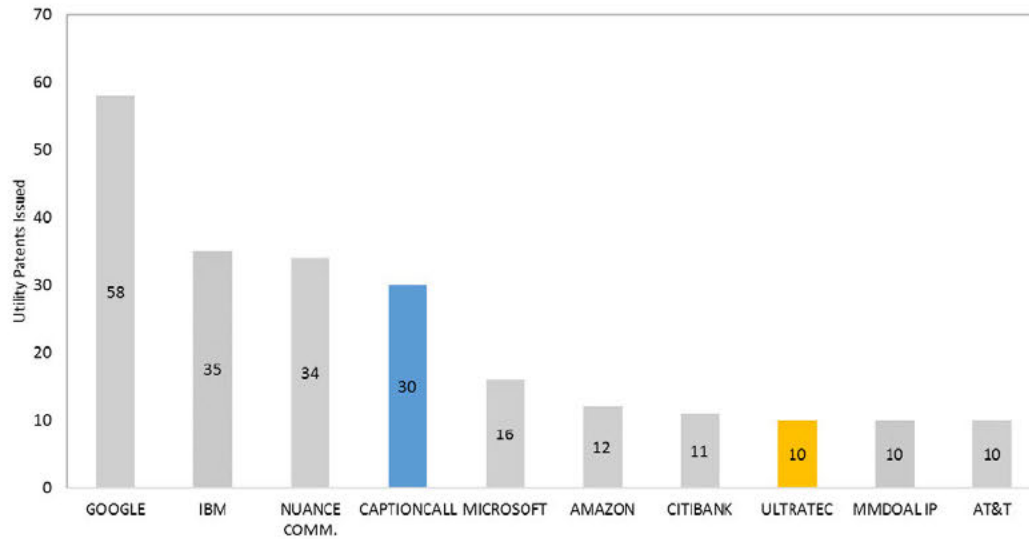
39. As I understand from CaptionCall's counsel, CaptionCall has an additional 17 IP CTS related published pending patent applications filed and published within the last four years, and another 20 unpublished pending patent applications (including 4 design patents) filed within the last thirty (30) months.
40. CaptionCall's innovation not only leads the IP CTS industry; it also places CaptionCall among the top innovators in fields related to IP CTS. As shown in Figure 3 below, CaptionCall has the fourth-greatest number of utility patents issued over the past five years in the space of aided-telecommunications services – which I determined based on the most common Cooperative Patent Classification (“CPC”) patent classes associated with CaptionCall's or Ultratec's patents, as refined by IP CTS related keywords,³⁸ above firms like Microsoft, Amazon, and AT&T. CaptionCall's intellectual property portfolio contains innovations that span many aspects of IP CTS, including user interface enhancements, improved accuracy, improved security, and enhanced integration of ASR technologies, and innovations that lead to cost reductions.

³⁸ In constructing the underlying patent data, I compiled a list of utility patents that are associated with the most common CPC patent classes of CaptionCall and Ultratec's IP CTS utility patents. These common CPC classes are H04M3/42391, H04M1/2475, G10L15/26, H04M2201/40, H04M11/066, H04M2201/60, which together account for 77 percent of CaptionCall and Ultratec's utility patents combined. I then filtered the list using IP CTS related keywords such as “caption,” “transcription,” “TTY,” “TDD,” “audiogram,” “hearing loss,” “deaf,” “voice over internet” and excluded any VRS-related patents by removing patents that contain either “video relay” or “video communication” in its description. I further refined the patents for CaptionCall and Ultratec after consulting with CaptionCall's patent counsel. I note that this approach sustains the possibility of overcounting competitors' patents and thus likely understates CaptionCall's innovation position among competitors.

Figure 3: Top 10 U.S. IP CTS-Related Utility Patent Recipients, 2015 – 2019

Notes: Limited to CaptionCall and Ultratec's most common CPC patent classes and IP CTS-related keywords

Source: Appendix 7



41. Notwithstanding the fact that the number of Ultratec's granted patents have waned over the past decade relative to other IP CTS patent holders, it appears that Ultratec still generates a considerable amount of royalties that it collects from IP CTS providers (Hamilton Relay and Sprint) through licensing the intellectual property that it created in the past. In this context, the distortion created from differential treatment of innovation expenses associated with different organizational structures favors independent entities such as Ultratec by allowing such royalties to continue to be reimbursed under the proposed cost-based system essentially without limit (which in turn allows providers to continue spending on licensing fees the same way they did before), and thus reinforces Ultratec's revenue generation from these royalties, despite Ultratec's lack of recent innovation.

42. Moreover, this distortion would greatly constrain the return on innovations generated by vertically-integrated firms such as CaptionCall, and thus create disincentives for CaptionCall to continue in the same way its substantial recent and ongoing innovation efforts. Under the proposed differential treatment of innovation expenses associated with different organizational structures – unlike a structure of equal treatment or under a market-based system – vertically-integrated firms would have limited mechanism by which to earn returns on their innovations commensurate with the value their innovation brings to the market. Instead, vertically-integrated firms would be limited in the “return” they obtain for their innovations by the potential recoupment of innovation expenses incurred through the inclusion of such expenses in the cost base upon which the regulated compensation rate would be determined. Thus, this distortion would create disincentives for CaptionCall to optimally invest in innovation. In other words, CaptionCall would continue to invest in innovation to the extent the associated expenses could be reimbursed under the proposed cost-based system, but the level of such innovation efforts would be significantly reduced compared to a world in which vertically-integrated innovators were treated equally as non-vertically-integrated innovators in terms of innovation expenses.
43. This could result in an overall increase in cost to the TRS Fund (the “Fund”), most notably in the area of reductions in marginal costs. Economists have long recognized that cost-based rate of return regulation significantly hampers innovation that reduces marginal costs and makes production more efficient, as innovators/providers see their cost-based compensation rates reduced by the marginal cost reduction associated with the innovation.³⁹ A royalty-based consideration for such innovations allows for both the innovator and the Fund to share the benefits of the cost reduction (with suitable oversight), and preserves the incentive to innovate.

³⁹ See, e.g., Cabral, Luis and Michael Riordan (1989), “Incentives for Cost Reduction Under Price Cap Regulation”, *Journal of Regulatory Economics*, Vol.1, pp. 93-102.

IV. REGULATORY TREATMENT OF INNOVATION EXPENSES THAT PRESERVE COMPETITIVE BALANCE IN IP CTS INNOVATION

44. As demonstrated in the previous section, the differential treatment of innovation expenses among vertically-integrated and non-vertically-integrated IP CTS innovators/providers in the compensation rate mechanism proposed in the 2018 Order and Further Notice will result in material distortions to the incentive to innovate, with vertically-integrated innovators/providers facing limits of the returns to investment associated with their innovation efforts that non-vertically-integrated firms do not. As a general matter, such distortions lead to suboptimal levels of innovation and create an imbalance in innovation competition, wherein vertically-integrated firms face a competitive disadvantage vis-à-vis non-integrated innovation rivals. These distortive effects are particularly acute in the current IP CTS environment, with Ultratec operating as a non-provider licensor (earning royalties through licenses with independent providers) and CaptionCall operating as both an innovator in IP CTS and as a provider of IP CTS.
45. Solutions to these distortions should restore the balance in incentives associated with IP CTS innovative activity, ideally mirroring the optimal incentives set in place through free market-based decisions to innovate. As noted in other submissions to the Commission, alternative rate methodologies, such as price caps or reverse auctions, take the concept of rate-making based on allowable expenses (including innovation expense) out of the regulatory framework, thereby effectively allowing market forces to determine socially optimal levels of innovation.⁴⁰ As such, that is what I would recommend first and foremost, and I understand such rate methodologies remain under consideration in these proceedings.
46. Leaving aside these – in my view preferable – rate methodologies that are not tied to reported costs, in this section I explore reasonable and equitable approaches in the

⁴⁰ The Commission's MARS methodology which relied on competitively bid results from state captioned telephone service contracts also did not rely on reported costs and thus also did not distort the incentives to innovate as between vertically-integrated and non-vertically-integrated innovators.

treatment of innovation expenses in an allowable cost framework that would preserve competitive balance in IP CTS innovation between vertically-integrated and non-vertically-integrated firms. A logical economic solution to these distortions is to place these firms on equal footing in terms of the incentives each has to innovate. As noted previously, the treatment of innovation expenses in the form of royalties paid by a non-vertically-integrated provider to a third-party licensor preserves the market-based incentives for the innovator to select socially optimal innovation investments. The distortion inherent in the treatment of the vertically-integrated innovator is that the return available to this innovator is truncated and significantly based on the one-time costs of innovation, rather than the ongoing value that successful innovation generates. A coherent economic solution, therefore, would restore the fundamental economic link between the innovative efforts of the vertically-integrated firm, and the economic benefits such successful innovation actually generates.

47. Naturally, such a mechanism would look to compensate the vertically-integrated provider in a manner similar to the non-vertically-integrated provider, that is, through the inclusion of a royalty allowance in the ACRB that reflects the likely outcome of a market-based arm's-length license to the relevant intellectual property. A royalty that reflects an arm's-length consideration of the value of the innovation restores the basic economic elements of risk and reward in the investment in R&D and innovation commonly found in conventional high-tech industries, and thus generates more economically efficient outcomes. In the conventional risk-reward scenario of innovation investment, R&D expenditures are not recouped directly – rather, the innovating firm seeks to earn a return on its R&D investments based on the value of the innovations it successfully develops and those that it can profitably exploit itself, and/or for which it can find a market of licensees that find the value of the innovation worth the cost of the royalty.
48. In this context, under a regulatory framework in which 1) non-vertically-integrated innovators charge royalties and their licensees include the direct costs of the license in the form of royalties in the ACRB, *and* 2) vertically-integrated firms are allowed to incorporate an imputed royalty for their successful innovations in their ACRB; the economic incentive

mechanism in place for the indirect reward associated with undertaking research and development in IP CTS would be undistorted from the market-based competitive mechanism of innovation investment. As such, under this approach, there is no need for direct inclusion of R&D expenses in the ACRB. Indeed, under this proposed treatment of intellectual property costs in the ACRB, I understand CaptionCall would no longer be seeking to include any R&D expenditures in the ACRB.

49. Moreover, there are a variety of well-established economic and financial tools available to the Commission in reviewing and assessing innovation royalty expense inclusion in the ACRB charged by the innovator to the provider (either internally in a vertically-integrated setting, or externally in a non-vertically-integrated setting).⁴¹ As noted briefly above, the valuation of innovation/intellectual property generally, and the assessment of prices/royalties assigned to intellectual property, is a common problem in many aspects of the economy and manifests itself in at least the following exercises: (1) transfer pricing issues in intellectual property management across geographies; (2) determination of fair and reasonable non-discriminatory royalty structures among standard setting organizations in high technology areas; (3) “fairness” opinions in the assessment of asset purchase/divestiture value; and (4) the assessment of economic damages in the form of “reasonable royalties” in the context of intellectual property litigation, among others.
50. The U.S. Tax authorities, as well as tax authorities all over the world, are well versed in the transfer pricing mechanisms used by multinational companies to transfer asset rights (including intellectual property) between its international divisions, and in assessing the economic reasonableness (*i.e.*, the setting of transfer prices in accordance with arm’s-length transactions) of such methods and their resulting prices.
51. Standard setting organizations manage access to intellectual property owned by third parties necessary to practice the agreed-upon standard. Such organizations are concerned

⁴¹ See, e.g., FCC, *Economic Analysis Division* (updated Dec. 9, 2018), economic; Cong. Research Serv. R45699, *The Federal Communications Commission: Current Structure and Its Role in the Changing Telecommunications Landscape* (2019), <https://fas.org/sgp/crs/misc/R45699R45699.pdf>, p. 10.

with post-adoption opportunism, under which the owners of such intellectual property extract exorbitant royalties from standard practitioners due to the essential nature of the intellectual property included in the standard technology. To help eliminate this opportunism, companies whose intellectual property is originally a candidate for inclusion in the standard must agree *ex ante* to license their intellectual property post standard adoption at Fair, Reasonable, and Non-Discriminatory (“FRAND”) rates. These agencies enforce these FRAND representations and conduct fairness hearings to determine if rates being charged are indeed reasonable market rates, or reflect *ex post* opportunism.

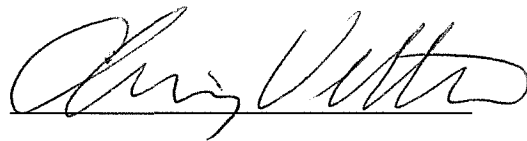
52. U.S. anti-trust agencies are also well versed in evaluating the economic reasonableness of asset pricing, at a general level and in the form of assigning rights to intellectual property in the form of divestiture proceedings associated with the sale of certain rights/assets to alleviate antitrust concerns in mergers and acquisitions. Commonly here, merging parties are called upon to grant access to key intellectual property to third parties at “fair” rates, and the U.S. agencies undertake analyses similar to those that would be called for in this proposal to ascertain the arm’s-length reasonableness of these offers and transactions.
53. I have extensive experience in evaluating the appropriate royalty to assign to intellectual property where no explicit arm’s-length transaction associated with the IP exists. In the assessment of damages for patent infringement, a common form of compensation awarded to the patentee for the infringing sales is a “reasonable royalty” levied upon the infringer’s sales. In very rare cases, this royalty can be ascertained from an existing, arm’s-length licensing program that has been historically undertaken by the patentee. Far more commonly, there are no arm’s-length transactions associated with the intellectual property at issue, and damages must be estimated by simulating a hypothetical licensing negotiation between the patentee and the infringer to determine the reasonable royalty. In this context, there are numerous tools economists, accountants, and licensing experts use to assess the value of a license and the appropriate royalty. These include common valuation methods used in intellectual property valuation (the income, market and cost approaches), and the application of the “*Georgia Pacific Factors*” (a listing of these Factors is provided in

Appendix 8), a series of 15 economic and financial factors that provide insight into the likely royalty that would be arrived at in the hypothetical negotiation.

54. As noted above, there are three common valuation methods used to assess the value of intellectual property generally and in the context of reasonable royalty damages in particular: the Income Approach, the Market Approach, and the Cost Approach. A central component in any valuation of intellectual property rights is the incremental financial gain or income generated by the granting of the rights. The Income Approach seeks to identify, capture, and quantify this incremental value. Under the Market Approach, the contribution of the value of the intellectual property in question as utilized in the products that incorporated the patented invention can be assessed by observing actual market transactions for comparable technologies. Under the Cost Approach, the value of an invention is assessed by considering any cost advantage the invention may confer over alternative technologies that could be used to achieve similar end results.
55. Also as mentioned, reasonable royalties are also commonly assessed by applying the fifteen *Georgia Pacific Factors*. These Factors combine various economic, financial and technical indicia that direct the practitioner to identify the economic value of the “footprint of the invention” to be licensed, and the likely outcome of a negotiation between the patentee and the licensee (here an infringer) based on various bargaining conditions and dynamics associated with the two parties (*e.g.*, whether they are rivals or in an innovator/promoter relationship, whether the license sought is exclusive, *etc.*).
56. I personally have utilized these established intellectual property valuation methods and the fifteen *Georgia Pacific Factors* to identify a royalty for intellectual property where no arm’s-length royalty agreement exists in more than 200 consultative arrangements in my career, including as a damages expert, and as a special master for arbitration panel charged with assigning intellectual property values in the dissolution of innovation joint ventures. In my view, these methods would serve well as analytic tools with royalties proposed for the ACRB (both vertically-integrated firms, and non-vertically-integrated firms) can be assessed.

V. CONCLUSION

57. The Commission, in considering moving away from a market-based rate-setting methodology to one based on allowable costs, has proposed treating innovation expenses differently between providers that license IP from third parties (where royalties would be allowed in the allowable cost base), and vertically-integrated providers that pay an affiliate for the use of IP (where royalties would not be allowed). This unequal treatment will create distortions in competition among innovators in IP CTS, with vertically-integrated providers facing reduced incentives to innovate generally, and relative to those incentives facing non-integrated innovators. At its heart, this distortion arises because compensation for innovations available to vertically-integrated firms is dependent on the costs of innovation, rather than the benefits such successful innovation generates in IP CTS.
58. This distortion can be eliminated through the continued application of market-based compensation mechanisms, rather than allowable-cost-based rate setting. If allowable-cost-based rate setting is implemented, ensuring that the returns available to innovators for their successfully developed and deployed IP will be invariant to the organizational structure of the innovator/provider is central to preserving robust competition in IP CTS innovation, which will benefit the Fund and consumers. A mechanism by which royalties are captured in the allowable cost base for all providers – evaluated and assessed as part of the ACRB – will help encourage continued robust innovation competition in IP CTS, without exposing the Fund to potentially inflated royalty-based costs.



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APPENDIX 1



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CHRISTOPHER A. VELLTURO

President

Over the course of his career, Dr. Vellturo has performed a wide variety of economic and econometric analyses and provided expert testimony in the context of mergers and acquisitions, antitrust litigation, intellectual property litigation and numerous other matters spanning a broad array of industries. Dr. Vellturo has testified on economics-related matters in numerous U.S. District Courts, as well as at the Canadian Competition Bureau, and before arbitral tribunals acting under the rules of arbitration of the American Arbitration Association. He has appeared before the U.S. Department of Justice, the Federal Trade Commission, various states' Attorneys General offices, the Federal Reserve Bank Board of Governors, and numerous other regulatory agencies on merger-related issues and other antitrust matters. Dr. Vellturo has also made appearances at hearings before the European Commission, and other antitrust enforcement agencies around the world. To date, he has performed economic analyses in over one hundred merger matters, in excess of seventy antitrust actions and well over one hundred intellectual property actions.

Dr. Vellturo has taught graduate-level economics at Boston University's School of Management.

Prior to forming Quantitative Economic Solutions, LLC (QES), Dr. Vellturo was a Principal at Analysis Group/Economics (AG/E) and a Senior Vice President and member of the Board of Directors at National Economic Research Associates (NERA).

Dr. Vellturo has published on a variety of topics, including merger and acquisition-related efficiencies, price discrimination, differentiated product analysis and market definition. His research has appeared in leading academic journals, including *Antitrust*, the *Antitrust Law Journal*, and the *Journal of Economics and Management Strategy*. Dr. Vellturo is a recipient of the Bradley Fellowship in Public Economics and has served as a referee for *American Economic Review* and *Rand Journal of Economics*.

A Ph.D. graduate in Economics from the Massachusetts Institute of Technology, Dr. Vellturo also holds a Sc.B. in Applied Mathematics and Economics from Brown University, where he graduated *magna cum laude* and *Phi Beta Kappa*.

EDUCATION

- 1989 Ph.D. in Economics, Massachusetts Institute of Technology
 Primary Fields: Econometrics, Industrial Organization
 Secondary Fields: Public Finance, Game Theory, Law and Economics
- 1983 Sc.B. in Applied Mathematics and Economics (*magna cum laude*), Brown University

PROFESSIONAL EXPERIENCE

- 2008-Present **Boston University, School of Management**
 Instructor – Department of Finance & Economics
- 2002-Present **Quantitative Economic Solutions, LLC**
 President/Manager – Direct research on microeconomic issues in litigation and non-litigation matters. Areas of particular focus include: antitrust, regulation, and damages assessment in intellectual property and contract matters.
- 2000-2002 **Analysis Group/Economics**
 Principal - Direct research and provide expert testimony on a variety of microeconomic issues with particular emphasis on antitrust, intellectual property, and mergers and acquisitions. Expert reports and testimony presented in U.S. District Court. Presented antitrust economic analyses to Federal Trade Commission, U.S. Department of Justice, Federal Reserve Bank Board of Governors and the European Commission.
- 1996-2000 **National Economic Research Associates, Inc.**
 Senior Vice President (1999-2000)
 Vice President (1996-1999)
- 1991-1996 **Cambridge Economics, Inc.**
 Director - Directed research and provided expert testimony on a variety of microeconomic issues with particular emphasis on antitrust, intellectual property, and mergers and acquisitions. Prior expert testimony provided in U.S. District Court and before the American Arbitration Association. Presented antitrust economic analyses to U.S. Department of Justice, Federal Trade Commission (Antitrust Division), state Attorneys General offices, and the Federal Reserve Bank Board of Governors.
- 1989-1991 **National Economic Research Associates, Inc.**
 Senior Consultant - Directed and performed research relating to issues of antitrust, intellectual property, mergers and regulation.
- 1987 **Department of Economics, M.I.T.**
 Teaching Assistant - Undergraduate econometrics.

- 1985-1989 **Dean Ann F. Friedlaender, M.I.T.**
Research Associate - Participated in research relating to transportation pricing and capital allocation responses to regulatory changes.
- 1983-1985 **National Economic Research Associates, Inc.**
Research Associate - Conducted research on a wide variety of issues including antitrust, railroad rate setting, optimal landfill pricing, and PCB and asbestos abatement strategies.

AWARDS AND PROFESSIONAL ACTIVITIES

- 1987-1989 Recipient, Bradley Fellowship in Public Economics
- 1986 M.I.T. Departmental Fellowship
- 1983 Phi Beta Kappa, Brown University
- 1983 Sigma Xi, Brown University
- Present Journal Referee for *American Economic Review* and *Rand Journal of Economics*
- Present Member, American Economic Association
- Present Member, American Bar Association

TESTIFYING HISTORY (PAST FOUR YEARS)

- 3M Company & 3M Innovative Properties Company v. Kerr Corporation
United States District Court for the District of Delaware, Civil Action No. 17-01730-LPS-CJB
- CardioNet LLC and Braemar Manufacturing, LLC v. InfoBionic, Inc.
United States District Court for the District of Massachusetts, Civil Action No. 1:15-cv-11803-IT
- Novartis Pharmaceuticals Corporation v. Accord Healthcare, Inc., et al.
United States District Court for the District of Delaware, C.A. No. 18-1043-LPS
- Array Technologies, Inc. v. Colin Mitchell, NEXTracker, Marco Garcia, Daniel S. Shugar, Scott Graybeal, and Flextronics International U.S.A., Inc.
United States District Court for the District of New Mexico, Civil Action No. 1:17-cv-00087-JAP-LF
- In the matter of the arbitration between Intellia Therapeutics, Inc. and Caribou Biosciences, Inc.
Before the JAMS Arbitration Panel, Reference No. : 1425027888
- Astellas Pharma Inc., Astellas Ireland Co., Ltd., and Astellas Pharma Global Development, Inc., v. Actavis Elizabeth LLC, et al.
United States District Court for the District of Delaware. C.A. No. 1:16-905 (JFB0 (CJB)
(Consolidated)
- Orexo AB and Orexo US, Inc. v. Actavis Elizabeth, LLC, Actavis Pharma, Inc., Teva Pharmaceuticals USA, Inc., and Teva Pharmaceuticals Industries, Ltd.
United States District Court for the District of Delaware, C.A. No. 17-205-CFC
- Abbott Cardiovascular Systems, Inc., and Evalve, Inc., v. Edwards Lifesciences, LLC, and Edwards Lifesciences, Corp.
United States District Court for the District of Delaware, Case No. 1:19-cv-00149-MN
- Adocia S.A. v. Eli Lilly and Company
The American Arbitration Association, AAA 01-17-0005-2264
- RELX v. Informatica
United States District Court for the Southern District of New York. Case No. 16-cv-9718
- BTG International Limited, et al., v. Amneal Pharmaceuticals LLC, et al.
United States District Court for the District of New Jersey, Civil Action No. 2:15-cv-05909-KM-JBC
BTG International Limited, et al., v. Amerigen Pharmaceuticals, Inc., et al.
United States District Court for the District of New Jersey, Civil Action No. 2:16-cv-02449-KM-JBC
BTG International Limited, et al., v. Teva Pharmaceuticals USA, Inc.
United States District Court for the District of New Jersey, Civil Action No. 2:17-cv-06435-KM-JBC

- Ferring B.V., Ferring International Center S.A., and Ferring Pharmaceuticals, Inc. v. Serenity Pharmaceuticals, LLC and Reprise Biopharmaceuticals, LLC
United States District Court for the Southern District of New York. Case No. 17-cv-9922 (RWS) ECF CASE
- Novo Nordisk Inc. and Novo Nordisk A/S v. Teva Pharmaceuticals USA, Inc.
United States District Court for the District of Delaware, C.A. No. 1:17-cv-00227
- Zimmer Surgical, Inc. and Dornoch Medical Systems, Inc. v. Stryker Corporation and Stryker Sales Corporation, and Stryker Corporation and Stryker Sales Corporation v. Zimmer Surgical, Inc., Zimmer, Inc., Dornoch Medical Systems, Inc., and Zimmer U.S., Inc.
United States District Court for the District of Delaware, C.A. No. 16-679-RGA
- Immunex Corporation; Amgen Manufacturing, Limited; and Hoffman La-Roche Inc.; v. Sandoz Inc.; Sandoz International GMBH; and Sandoz GMBH
United States District Court for the District of New Jersey, Civil Action No. 2:16-cv-01118
- Desktop Metal, Inc., v. Markforged, Inc. and Matin Parangi
United States District Court for the District of Massachusetts, Civil Action No. 1:18-cv-10524-WGY
- MorphoSys AG v. Janssen Biotech, Inc., Genmab US Inc., and Genmab A/S
United States District Court for the District of Delaware, C.A. No. 16-221 (LPS)(CJB)
- Nevro Corp. v. Boston Scientific Neuromodulation Corp.
United States Patent and Trademark Office, Case Nos. IPR2017-01812, U.S. Patent No. 6,895,280 B2
- Plastipak Packaging, Inc. v. Niagara Bottling, Inc.
United States District Court for the Eastern District of Virginia, Case 1:17-cv-01463-AJT-MSN
- Crane Security Technologies, Inc., and Visual Physics, LLC, v. Rolling Optics AB
United States District Court for the District of Massachusetts, C.A. No. 14-cv-12428-LTS
- BASF Agro B.V., Arnheim (NL), Wadenswil Branch, and Bayer S.A.S., v. Makhteshim Agan of North America, Inc., and Control Solutions, Inc.
United States District Court for the Middle District of North Carolina. Civil Action No. 1:10-cv-00267-WO-LPA
- Roche Diagnostics GmbH and Roche Molecular Systems, Inc. v. Enzo Biochem, Inc. and Enzo Life Sciences, Inc.
United States District Court for the Southern District of New York, Case No. 04 CV 4046 (RJS)
- Bayer Intellectual Property GmbH, Bayer Pharma AG, and Janssen Pharmaceuticals, Inc., v. Aurobindo Pharma Limited, Aurobindo Pharma USA, Inc., Breckenridge Pharmaceutical, Inc., Invagen Pharmaceuticals, Inc., Micro Labs Ltd., Micro Labs USA Inc., Mylan Pharmaceuticals Inc., Princeton Pharmaceutical Inc., Sigmapharm Laboratories, LLC, Torrent Pharmaceuticals, Limited, and Torrent Pharma Inc.
United States District Court for the District of Delaware, C.A. No. 15-902-RGA
Consolidated

- AstraZeneca LP and AstraZeneca AB v. Breath Ltd./ AstraZeneca LP and AstraZeneca AB v. Apotex, Inc. and Apotex Corp./ AstraZeneca LP and AstraZeneca AB v. Sandoz, Inc./ AstraZeneca LP and AstraZeneca AB v. Watson Laboratories, Inc.
United States District Court, District of New Jersey, Consolidated Civil Action No. 08 CV 1512 (RMB)(AMD)
- In re: Biogen '755 Patent Litigation
Retained by Pfizer/ Serono
United States District Court for the District of New Jersey
Civil Action No. 10-cv-02734(CCC) (JBC)
- Alacritech, Inc., v. Tier 3, et al.
United States District Court for the Eastern District of Texas, Marshall Division, Case No. 2:16-cv-00693-JRG-RSP
- Neopharm LTD., Promedico LTD., and Neopharm (Israel) 1996 LTD., v. Wyeth-Ayerst International, LLC F/K/A, Wyeth Ayerst International Inc.
United States District Court for the Southern District of New York, Case No. 1:14-cv-08192-SHS
- DexCom, Inc. v. AgaMatrix, Inc.
United States District Court for the Central District of California, Civil Action No. 1:16-cv-05947-SJO-AS
- Development Specialists, Inc., Solely in its capacity as assignee for the benefit of creditors of Idun Pharmaceuticals, Inc., v. AbbVie Inc.
- Koninklijke Philips Electronics, N.V. and Philips Electronics North America Corporation v. ZOLL Medical Corporation,
United States District Court, District of Massachusetts, Civil Action Nos. 1:10-cv-11041-NMG, 1:12-cv-12255-NMG
- Knowles Electronics, LLC v. AAC Technologies Holdings Inc. and American Audio Component, Inc.
United States District Court for the Northern District of Illinois, Case # 1:16-cv-3527
- Safe Gaming System, Inc. v. Atlantic Lottery Corporation, Nova Scotia Gaming Corporation, and Tech Link International Entertainment Limited.
Court File No. T-1043-12
- Dyson, Inc. v. Euro-Pro Sales Co.
United States District Court for the Northern District of Illinois, Case No. 14-CV-779
- Erfindergemeinschaft UroPep GbR v. Eli Lilly and Company, and Brookshire Brothers, Inc.
U.S. District Court, Eastern District of Texas, Marshall Division, Civil No. 2:15-cv-01202-JRG
- Wockhardt Bio AG, Petitioner, v. Janssen Oncology, Inc., Patent Owner
Case No. IPR2016-01582 U.S. Patent No. 8,822,438 B2

- BioMarin Pharmaceutical Inc. and Merck & CIE v. Par Pharmaceutical, Inc.
U.S. District Court, District of New Jersey, Civil Action No. 14-7203 (MAS)(TJB)
- ViaTech Technologies, Inc. v. Microsoft Corporation
United States District Court for the District of Delaware, C.A. No. 1:14-1226-RGA
- Arthrex Inc. v. Smith & Nephew, Inc. and Arthrocare Corp; Arthrex Inc. v. Smith & Nephew, Inc. and Arthrocare Corp.
U.S. District Court for the Eastern District of Texas, Marshall Division, Civil Action Nos. 2:15-cv-1047-RSP and 2:15-cv-1756-RSP
- UCB, Inc., UCB Pharma GMBH, Research Corporation Technologies, Inc. and Harris FRC Corporation v. Accord Healthcare, Inc., et al.
U.S. District Court, District of Delaware, Civil Action No. 1:13-cv-1206-LPS
- Bristol-Myers Squibb Co., E.R. Squibb & Sons LLC. ONO Pharmaceutical Co., Ltd., and Tasuku Honjo v. Merck & Co., Inc. and Merck Sharp & Dohme Corp.
U.S. District Court, District of Delaware, Civil Action Nos. 14-1131-GMS; 14-560-GMS; 15-572-GMS
- Actavis Laboratories UT, INC., v. UCB, INC.
U.S. District Court for the Eastern District of Texas, Marshall Division, Case No. 2:15-CV-1001-JRG-RSP
- Koninklijke Phillips N.V. and Philips Electronics North America Corporation v. ZOLL LifeCor Corporation.
U.S. District Court, District of Western Pennsylvania, Consolidated Civil Action No. 2:12-cv-01369-NBF
- Enzo Life Sciences, Inc. v. Roche Molecular Systems, Inc.
U.S. District Court, district of Delaware, Case No. 12 Civ. 106
- Enzo Life Sciences, Inc. v. Becton, Dickinson and Company, Becton Dickinson Diagnostics, Inc., and Geneohm Sciences, Inc.
U.S. District Court, District of Delaware C.A. No. 12-275-LPS
- Merck Sharp & Dohme Corp. v. Hospira, Inc.
U.S. District Court, District of Delaware, Consolidated Civil Action No. 14-915-RGA
- Gilead Sciences, Inc., Gilead Pharmasset LLC and Gilead Sciences Limited v. AbbVie Inc., and AbbVie Ireland Unlimited Company
U.S. District Court, District of Delaware, Consolidated Civil Action No. 13-2034-GMS
- MSC. Software Corporation v. Altair Engineering, Incorporated et al.
U.S. District Court, Eastern District of Michigan Southern Division, Case No. 2:07-cv-12807
- SAS Institute Inc. v. World Programming Limited
U.S. District Court, District of North Carolina, Civil Action No. 5:10-cv-00025-FL (E.D.N.C.)

- Novartis Pharmaceuticals Corporation, et. al. v. Wockhardt USA LLC, et. al.
U.S. District Court for the District of New Jersey, Civ.2:12-cv-03967-SDW-MCA
- Ronald A. Katz Technology Licensing L.P. v. FedEx Corporation, Federal Express Corporation, FedEx Corporate Services, INC., and FedEx Customer Information Services, Inc.
U.S. District Court, Western District of Tennessee, Case No. 2:15-cv-02329-JPM-tmp
- Janssen Pharmaceuticals, INC ., et al v. Actavis Elizabeth LLC, et al.,
U.S. District Court, District of New Jersey, Civil Action No. 2:13-cv-04507-CCC-MF
- Unimed Pharmaceuticals, LLC, Besins Healthcare Inc, and Besins Healthcare Luxembourg, Sarl v. Perrigo Company and Perrigo Israel Pharmaceuticals LTD
U.S. District Court, District of Delaware, Consolidated Civil Action No. 13-236 (RGA)

PUBLICATIONS AND PRESENTATIONS

“Lunch at Texas Law with Panel of Damages Experts.” Presented at the University of Texas School of Law’s Patent Damages Conference, Austin, Texas, June 9, 2016.

“Mock Trial: *Carnival Comics, Inc. v. DigiCom, LLP, et al.*” Presented at the 61st Annual Spring Meeting of the ABA Section of Antitrust Law, Washington, DC, April 11, 2013.

“Understanding How the Patent Cliff Will Re-Define the Endgame.” Presented at the 12th Annual Maximizing Pharmaceutical Patent Life Cycles Conference, New York, NY, October 4, 2011.

“Differentiated Products” in *Issues in Competition Law and Policy, Volume I*, ed. D. Wayne Collins, Section of Antitrust Law of the American Bar Association, 2008.

“When Fraud on the Patent Office Violates Section 2: A Mock Trial.” Presented at the 52nd Annual Spring Meeting of the ABA Section of Antitrust Law, Washington, DC, April 1, 2004.

“What Drives Consolidation?” Presented at the 28th Semiannual Members Meeting MIT/CRE, Cambridge, MA, May 14, 1998.

“Proving Unilateral Effects and Efficiencies in Merger Cases: A Demonstration.” Presented at the 46th Annual Spring Meeting of the ABA Section of Antitrust Law, Washington, DC, April 1, 1998.

“Creating An Effective Diversion: Evaluating Mergers With Differentiated Products,” *Antitrust*, Spring 1997.

“Economic Battles in the Antitrust Wars: Network Industries and Their Relevance to Antitrust in the Computer Industry.” Presented at the Washington State Bar Association’s Thirteenth Annual Antitrust, Consumer Protection and Unfair Business Practices Conference, November 8, 1996.

“Differentiated Products: New Tools for New Methods.” Presented at NERA’s Seventeenth Annual Antitrust & Trade Regulation Seminar, Santa Fe, NM, July 5, 1996.

“Market Definition Under Price Discrimination” (with J. A. Hausman and G. K. Leonard), *Antitrust Law Journal*, Vol. 64, No. 2 (Winter 1996).

“Learning-by-Doing in the Context of Antitrust Analysis” (with J. Hausman), April 1995.

“An Economic Analysis of ATM Surcharging,” prepared for Southeast Switch Inc., October 5, 1995.

“Cost Effects of Mergers and Deregulation in the U.S. Rail Industry” (with Berndt, *et al.*), *Productivity Issues in Services at the Micro Level*, ed. Zvi Griliches and Jacques Mairesse, Kluwer Academic Publishers, 1993.

“Cost Effects of Mergers and Deregulation in the U.S. Rail Industry” (with Berndt, *et al.*), *Journal of Productivity Analysis*, 4, 127-144, 1993.

“Rail Costs and Capital Adjustments in a Quasi-Regulated Environment” (with Friedlaender, *et al.*), *Journal of Transport Economics and Policy*, 131-152, May 1993.

“Deregulation, Mergers and Cost Savings in Class I U.S. Railroads, 1974-1986” (with Berndt, *et al.*), *Journal of Economics and Management Strategy*, Vol. 1, No. 2, 1992.

“Observations on Pre-Trial Bargaining Models,” MIT Mimeo, September 1989.

“The Deregulation of the U.S. Rail Industry: Efficiency and Equity in Attaining Rail Viability,” Ph.D. Dissertation, Department of Economics, MIT, 1989.

“Achieving Cost Efficiency Through Merger: Evidence from the U.S. Rail Industry,” Presented at the American Economic Association Symposium on Mergers and Acquisitions, New York, December 29, 1988.

APPENDIX 2

DISTORTION CALIBRATION

A. Overview

1. In this Appendix, I develop a series of economic models that make clear the distortion created by the differential treatment of innovation expenses between non-vertically-integrated innovators and providers and vertically-integrated innovators/providers in terms of changes to their profits. I will begin by assuming a world with single compensation rate (“uniform rate”) for all providers to establish a baseline; I then show how additional distortions would arise if one were to move to a world where “tiered rates” were adopted.

B. Single Compensation Rates (“Uniform” Rates)

2. To start, I assume a successful innovation and development of intellectual property enables providers to experience a reduction in allowable marginal costs in providing IP CTS of $\$x$ /minute; I further assume the non-vertically-integrated innovator is able to secure royalties from the negotiation of a license agreement with an IP CTS provider at $\$r$ /minute. For notational purposes, I define the non-vertically-integrated innovator and provider as n and d , respectively, and the vertically-integrated innovator/provider as i . For the remaining notations, I define N as the total number of IP CTS minutes delivered by all providers in a given year, and s along with corresponding provider subscript as the share of total IP CTS minutes delivered by a specific provider.

1. Non-Vertically Integrated Innovator and Provider

3. I first turn to the non-vertically-integrated innovator and provider. For the provider, the total cost reduction that goes into cost base under the current proposed ACRB is an $\$x$ /minute decrease in service cost net of the royalty paid to the innovator $\$r$ /minute, a net cost savings of $\$(x - r)$ /minute.¹ As specified in the proposed ACRB, the per-minute IP CTS compensation rate is determined as the weighted average of historical per-minute expenses by all providers in the prior

¹ It goes without saying that r is smaller than x ; otherwise it would not make economic sense for the provider to license from the innovator.

year plus some allowed margin.² In this context, any increase (decrease) in a provider's allowable cost base would lead to an increase (decrease) to the overall rates. While the compensation rate reflects a single rate derived from the overall costs of all providers divided by the service minutes of all providers, the added (lowered) cost for a provider only applies to the provider's minutes, which is adjusted by the provider's share of total IP CTS minutes delivered. Accordingly, the cost reduction incurred by the provider would lead to a decrease in the overall compensation rate to all providers, but the reduction in compensation for this provider would be the cost reduction times its minute shares, s_d , holding other providers' costs constant. Therefore, a $\$(x - r)$ /minute cost reduction that goes into the cost base would lead to a $\$(x - r)s_d$ /minute decrease in the compensation that the provider would receive.

4. Combining all the pieces, the change in profit of the non-vertically-integrated provider – measured per-minute – as a result of the marginal cost-reducing innovation is calculated as:

$$(x - r) - s_d \times (x - r) = (1 - s_d) \times (x - r) > 0. \quad (1)$$

5. For the non-vertically integrated innovator, its profit equals the royalty paid by providers, which is $\$r$ /minute. It is clear that the non-vertically-integrated innovator and provider both experience an increase in their profits as a result of the innovation. The innovator receives market-based royalties, and the provider receives the difference in the value of innovation to its business and the royalty paid, adjusted by changes to the service cost recoupment. The increase in profit provides incentives for the innovator to continue innovation, and for the provider to continue licensing from the innovator.
6. Assuming the proprietary life of the innovation's associated intellectual property is T years, the net present value of total surplus (here, profit) increase for the provider and innovator combined as a result of the innovation would be:

$$\Delta \Pi_{n+d} = \sum_{t=1}^T \beta^{t-1} N_t s_{d,t} [(1 - s_{d,t}) \cdot x + s_{d,t} \cdot r], \quad (2)$$

² 2018 Order and Further Notice, ¶ 23.

where β is the discount factor, N_t is the total number of minutes delivered in year t in IP CTS, and $s_{d,t}$ is the non-vertically-integrated provider's share of total minutes delivered in year t .

2. Vertically-Integrated Innovator/Provider

7. Now assume that the same innovation was created by a vertically-integrated firm. Unlike the non-vertically-integrated provider, the full $\$x$ /minute of marginal service cost reduction is reflected in the integrated firm's allowable cost base. As a result, the regulatorily determined compensation the integrated provider would receive decreases by $\$x \cdot s_i$ /minute, where s_i is integrated provider's share of total IP CTS minutes delivered. Under the current proposed ACRB, the integrated innovator/provider has no other mechanism to earn any returns to the innovation it developed but to recoup only the cost of its R&D work undertaken in that year on a per-minute basis. The change of profit to the vertically-integrated innovator/provider in the first year on a per-minute basis would be:

$$(1 - s_i) \cdot x + \frac{R\&D}{N} \quad (3)$$

8. In order to make the total profit change to the integrated innovator/provider comparable to that of the non-vertically-integrated innovator and provider, I apply the same term associated with the intellectual property in calculating the total net present value for the integrated innovator/provider. The corresponding total net present value for the integrated innovator/provider is as follows:

$$\Delta \Pi_i = s_{i,1} \cdot R\&D + \sum_{t=1}^T \beta^{t-1} N_t s_{i,t} (1 - s_{i,t}) \cdot x \quad (4)$$

9. Assuming (for expositional clarity purposes only) that the non-vertically-integrated provider and integrated provider have the same share of minutes delivered, i.e., $s_i = s_d = s$, the distortion can be calculated as the following:

$$Distortion = \Delta \Pi_{n+d} - \Delta \Pi_i = \sum_{t=1}^T \beta^{t-1} N_t s_t^2 \cdot r - s_1 \cdot R\&D \quad (5)$$

10. With the recognition that the extended recurring stream of royalties to be paid will significantly exceed the one-time R&D costs associated with the innovation's development (under the basic

concept that innovators in expectation will pursue R&D opportunities where the expected benefit of the innovation will outstrip the expected cost of developing the benefit), the distortion shown in Equation (5) clearly demonstrates that there is a significant portion of the total surplus retained by the non-vertically-integrated innovator and service provider that is missing in the integrated setting, and is merely due to their different organizational structures. Moreover, this distortion is an increasing function of the non-vertically-integrated provider's share of minutes as well as the royalty rate that the non-vertically-integrated innovator charges providers. In the context of IP CTS, this distortion is particularly problematic as CaptionCall is a major IP CTS provider, and at the same time, Ultratec has received and continues to receive considerable royalties from licensing its patents to third-party providers such as Hamilton Relay and Sprint.

C. Tier-based Compensation Rate

11. In this subsection, I will show that this distortion worsens considerably under a tiered rate setting that explicitly or implicitly varies each provider's compensation based on each provider's costs, compared with the uniform rate setting as discussed above. In tiered rate setting, providers receive specific compensation rates under the mechanism tied to changes in their own costs (not in the overall industry costs). Unlike the uniform rate setting where the reduction in compensation rate is tempered across providers (in proportion to the provider's associates minute share), in tiered rate setting, cost reduction is effectively a one-to-one mapping to the reduction in recoupment. In other words, s_d in Equation (1) is now equal to 1. Therefore, any potential cost reduction a provider could benefit from the innovation (net any royalty paid) would be offset by the corresponding reduction in the compensation rate, thus leaving profit for the provider essentially unchanged. Notably, as the royalty is allowable and fully reflected in the cost base for the non-vertically-integrated provider under the proposed ACRB, the royalty effectively migrates out of the regulatory system and remains as a return to the non-vertically-integrated innovator. Thus, the non-vertically-integrated innovator continues to receive the royalty rate at $\$r/\text{minute}$. The total surplus increase in a tiered rate setting for the non-vertically-integrated innovator and provider is now reduced to the following:

$$\Delta\Pi_{n+d} = \sum_{t=1}^T \beta^{t-1} N_t s_{d,t} r \quad (6)$$

12. In the absence of regulatory oversight, there is essentially no limit on the amount of royalty paid that providers are allowed to recoup, this mechanism creates incentives for opportunistic setting of artificially high royalties which can be used to subvert the passing of “net” cost savings through the ACRB, which in turn could potentially lead to a higher compensation rate. More importantly, as there is no regulatory cap of recoupment for royalties, the non-vertically-integrated innovator and provider under a tiered rate setting can potentially manipulate the royalty to be artificially high such that both the innovator and provider can each receive an even higher surplus increase than they would with a uniform rate. This opportunistic setting of artificially high royalties would be detrimental to the TRS Fund.
13. For the vertically-integrated innovator/provider, however, there is no royalty mechanism by which any of the surplus generated by the innovation remains as a return for the vertically-integrated innovator/provider, as the full savings of the innovation directly go into the cost base which in turn translate into a full reduction in compensation, i.e., the part $(1 - s_i) \cdot x$ in Equation (3) and (4) now goes (essentially) to zero. Thus, the only compensation effectively available to the vertically-integrated innovator/provider is the one-time recoupment of its allowable R&D expenses in the ARCB (plus the prescribed return). As discussed above, the one-time R&D recoupment – by focusing only on the costs – ignores the associated economic value the innovation brings to the market, in addition to the fact that royalty recoupment carries on for many years so long as the associated intellectual property remains effective.
14. Therefore, the distortion under the tiered rate setting is not just a portion of the total surplus retained by the non-vertically-integrated innovator and provider, as in the uniform rate setting, but the *full* amount of that total surplus net of the R&D recoupment as shown in Equation (7) below,

$$Distortion = \sum_{t=1}^T \beta^{t-1} N_t s_t \cdot r - s_1 \cdot R\&D \quad (7)$$

Therefore, in the tiered-rate setting, the incentives for vertically-integrated firms to innovate are sharply reduced, while non-vertically-integrated firms essentially retain their full incentives to innovate, as they can effectively extract value from regulatory oversight through the royalty.

Appendix 3

Annual Growth Rate of U.S. Utility Patents Issued 2009 – 2018

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Average Annual Growth Rate ²
Number of Patents Issued (thousands)	168	220	225	254	279	302	329	337	355	339	
Annual Growth Rate ¹ (%)		31.5%	2.4%	12.7%	9.8%	8.2%	8.9%	2.3%	5.4%	-4.4%	8.5%

Notes:

1. Annual Growth Rate in Year [Y] = (Patents Issued in Year [Y]) / (Patents Issued in Year [Y-1]) - 1.
2. Average Annual Growth Rate calculated as the average of the individual annual growth rates from 2010 to 2018.

Sources:

2009-2014: <https://bulkdata.uspto.gov/data/patent/historical/2014>

2015: <https://bulkdata.uspto.gov/data/patent/grant/redbook/bibliographic/2015>

2016: <https://bulkdata.uspto.gov/data/patent/grant/redbook/bibliographic/2016>

2017: <https://bulkdata.uspto.gov/data/patent/grant/redbook/bibliographic/2017>

2018: <https://bulkdata.uspto.gov/data/patent/grant/redbook/bibliographic/2018>

Appendix 4

U.S. Utility Patents Issued - Computer & Electronics Sector 2000 – 2014

	2000	2001	2002	2003	2004
[1] Computer & Electronics Patents Issued ¹ (thousands)	64	70	73	76	81
[2] Total Utility Patents Issued (thousands)	158	166	167	169	164
[3] Computer & Electronic Patents Issued as Percentage of Total Utility Patents Issued² (%)	41%	42%	44%	45%	49%
	2005	2006	2007	2008	2009
[1] Computer & Electronics Patents Issued ¹ (thousands)	74	96	87	92	99
[2] Total Utility Patents Issued (thousands)	144	174	157	158	168
[3] Computer & Electronic Patents Issued as Percentage of Total Utility Patents Issued² (%)	52%	55%	55%	58%	59%
	2010	2011	2012	2013	2014
[1] Computer & Electronics Patents Issued ¹ (thousands)	127	130	148	163	177
[2] Total Utility Patents Issued (thousands)	220	225	254	279	302
[3] Computer & Electronic Patents Issued as Percentage of Total Utility Patents Issued² (%)	58%	58%	58%	58%	59%

Notes:

1. "Computer & Electronics" refers to the combination of the patent sub-categories of Computer & Communications and Electrical & Electronic, defined in the National Bureau of Economic Research (NBER) Patent Citation Data (available at <https://www.nber.org/patents>).
2. [3] = [1] / [2].

Source:

<https://bulkdata.uspto.gov/data/patent/historical/2014>

Appendix 5

U.S. IP CTS Related Utility Patents Issued by IP CTS Provider 2000 – 2019

	CaptionCall	ClearCaption	Mezmo	Sprint	Ultratec
2000					2
2001				1	1
2002					1
2003				1	4
2004				2	1
2005				3	2
2006				2	1
2007				1	1
2008					
2009					
2010					1
2011				1	1
2012				2	
2013				5	2
2014				4	3
2015	4		1	4	1
2016	10		1		1
2017	12	1		2	
2018	13	1		2	6
2019	17			2	3

Note:

In constructing the underlying patent data, I compiled a listing of utility patents granted to IP CTS providers and filtered the list using IP CTS related keywords such as “caption”, “transcription”, “TTY”, “TDD”, “audiogram”, “hearing loss”, “deaf”, and “voice over internet.” I also excluded any VRS-related patents by removing patents that contain either “video relay” or “video communication” in their descriptions. I further refined the patents for CaptionCall and Ultratec after consulting with CaptionCall’s patent counsel. I note that this approach sustains the possibility of overcounting competitors’ patents and thus likely understates CaptionCall’s innovation position among competitors. To be conservative, I include all utility patents granted to ClearCaption and Mezmo, regardless of whether the patent contains the IP CTS associated keywords above. I used the current patent assignee to determine patent owners.

Source:

Acclaim IP Patent Search and Analysis

Appendix 6

Estimated Status of Ultratec IP CTS Related Utility Patents Issued U.S., 2019 – 2024

	Number of Utility Patents Issued to Expire by Year	Percentage of Total Effective Ultratec Utility Patents Issued ¹
2019	26	55%
2020	0	0%
2021	6	13%
2022	0	0%
2023	2	4%
2024	0	0%

Notes:

In constructing the underlying patent data, I compiled a list of Ultratec’s utility patents, and filtered the list using IP CTS related keywords such as “caption”, “transcription”, “TTY”, “TDD”, “audiogram”, “hearing loss”, “deaf”, and “voice over internet.” I further excluded any VRS-related patents by removing patents that contain either “video relay” or “video communication” in their descriptions. Lastly, I refined Ultratec’s patent list after consulting with CaptionCall’s patent counsel.

1. Total effective Ultratec utility patents include all IP CTS related utility patents that have been historically granted to Ultratec and exclude patents that are either invalid or unenforceable based on my understanding from counsel.

Source:

Acclaim IP Patent Search and Analysis

Appendix 7

Top 10 U.S. IP CTS Related Utility Patent Innovators 2015 – 2019

Patent Assignee	Number of Patents Issued
Google	58
IBM	35
Nuance Communications	34
CaptionCall	30
Microsoft	16
Amazon	12
Citibank	11
Ultratec	10
MModal IP	10
AT&T	10

Note:

In constructing the underlying patent data, I compiled a listing of utility patents that are associated with the most common CPC patent classes of CaptionCall and Ultratec's IP CTS utility patents. These common CPC classes are H04M3/42391, H04M1/2475, G10L15/26, H04M2201/40, H04M11/066, H04M2201/60, which together account for 77 percent of CaptionCall and Ultratec's utility patents combined. I then filtered the list using IP CTS related keywords such as "caption", "transcription", "TTY", "TDD", "audiogram", "hearing loss", "deaf", and "voice over internet", and excluded any VRS-related patents by removing patents that contain either "video relay" or "video communication" in their descriptions. I further refined the patents for CaptionCall and Ultratec after consulting with CaptionCall's patent counsel. I note that this approach sustains the possibility of overcounting competitors' patents and thus likely understates CaptionCall's innovation position among competitors. I used the current patent assignee to determine patent owners.

Source:

Acclaim IP Patent Search and Analysis

APPENDIX 8

FIFTEEN *GEORGIA-PACIFIC* FACTORS¹

1. The royalties received by the patent owner for the licensing of the patent-in-suit, proving or tending to prove an established royalty;
2. The rates paid by the licensee for the use of other patents comparable to the patent-in-suit;
3. The nature and scope of the license, as exclusive or non-exclusive, or as restricted or non-restricted in terms of territory or with respect to whom the manufactured product may be sold;
4. The licensor's established policy and marketing program to maintain its patent monopoly by not licensing others to use the invention or by granting licenses under special conditions designed to preserve that monopoly;
5. The commercial relationship between the licensor and the licensee, such as whether they are competitors in the same territory in the same line of business, or whether they are inventor and promoter;
6. The effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of its non-patented items; and the extent of such derivative or convoyed sales;
7. The duration of the patent and the term of the license;
8. The established profitability of the product made under the patent; its commercial success; and its current popularity;
9. The utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results;
10. The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefits to those who have used the invention;

¹ *Georgia-Pacific Corp. v. U.S. Plywood*, 318 F. Supp. 1116 (S.D.N.Y. 1970).

11. The extent to which the infringer has made use of the invention, and any evidence probative of the value of that use;
12. The portion of the profit or of the selling price that may be customary in the particular business or in comparable businesses to allow for the use of the invention or analogous inventions;
13. The portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer;
14. The opinion testimony of qualified experts; and
15. The amount that a licensor (such as the patent owner) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement; that is, the amount that a prudent licensee – who desired, as a business proposition, to obtain a license to manufacture and sell a particular article embodying the patented invention – would have been willing to pay as a royalty and yet be able to make a reasonable profit, and which amount would have been acceptable by a prudent patent owner who was willing to grant a license.