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September 1, 2017

VIA ELECTRONIC FILING (ECFS)

Marlene H. Dortch, Esq., Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

RE: **EX PARTE PRESENTATION**
Misuse of Internet Protocol (IP) Captioned Telephone Service;
Telecommunications Relay Services and Speech-to-Speech Services for
Individuals with Hearing and Speech Disabilities
CG Docket Nos. 13-24, 03-123

Dear Ms. Dortch:

On August 30, 2017, John Nelson, President of Hamilton Relay, Inc. ("Hamilton"), Dixie Ziegler, Vice President of Hamilton, and the undersigned counsel on behalf of Hamilton, met separately with Zenji Nakazawa, Public Safety and Consumer Protection Advisor to Chairman Pai, and Amy Bender, Wireline Legal Advisor to Commissioner O'Rielly.

The purpose of the meeting was to provide Commission staff with copies of the attached white paper prepared by the Brattle Group ("White Paper") concerning the interstate Telecommunications Relay Services Fund ("TRS Fund"). Among the White Paper's findings are the following:

- The percentage of total TRS minutes funded by the interstate TRS Fund in 1999 was an estimated 21%, with state TRS funds covering the remainder. The interstate TRS Fund's percentage increased to an estimated 94% by 2016, representing a significant shift in jurisdictional funding commitments;
- The interstate TRS Fund's nominal annual growth rate of 5.2% is reduced to a 1.1% annual growth rate after adjusting for inflation and controlling for shifts between state and federal jurisdictions;

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- Consequently, 80% of the perceived growth in the interstate TRS Fund is due to inflation and shifts in jurisdictional funding obligations;
- Inflation-adjusted IP CTS and VRS rates have not been trending upwards; thus any real increase in the interstate TRS Fund cannot be a result of compensation rates;
- The interstate TRS Fund's modest growth is likely demand-driven, and increased demand is likely the result of shifts in market demographics and is consistent with broader market trends outlined in the White Paper;
- Changes in the interstate TRS Fund contribution factor are mostly driven by changes in the contribution base rather than the interstate TRS Fund size.

In addition to summarizing these conclusions, Hamilton urged Commission staff to seek comment on these findings in a *Second Further Notice of Proposed Rulemaking* in this proceeding, along with various IP CTS rate methodologies that have been proposed in this proceeding, including the eight different approaches put forth by the TRS Fund Administrator¹ and the tiered rate proposal suggested by ClearCaptions.² Hamilton reiterated that, consistent with the white paper's conclusions,³ MARS is likely the best rate methodology for IP CTS given the structure and purpose of the TRS market.

Finally, Hamilton believes that rather than engaging in an unprecedented departure from a market-based rate methodology such as MARS to an artificial rate methodology established by a governmental agency, the effectiveness of MARS needs to be examined by the new Office of Economics and Data ("OED"). A review of MARS would be an appropriate undertaking for this important new office, and would ensure that any departure from MARS is based on sound and legally defensible economic policy. Such a review would also be consistent with Chairman Pai's

¹ Rolka Loube, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, at 19 (filed May 2, 2017). The White Paper addresses each of these eight options at pp. 30-34.

² Ex Parte filing of Clear Captions, LLC, CG Docket Nos. 13-24, 03-123 (filed Aug. 25, 2017) (substitute filing submitted Aug. 30, 2017). In connection with the IP CTS rate methodology, the Consumer & Governmental Affairs Bureau in May 2017 noted: "Because the Commission presently has an open rulemaking to address the appropriate compensation methodology for IP CTS, it is premature to select one of the [eight] specific recommendations listed above. Instead, as appropriate, *we may seek comment on certain of these recommendations as part of such pending rulemaking....*," thus suggesting that additional comment on these issues remains necessary. *Rolka Loube Associates Submits Payment Formulas and Funding Requirement for the Interstate Telecommunications Relay Services Fund for the 2017-2018 Fund Year*, Public Notice, 32 FCC Rcd 3880, 3881 (CGB 2017) (emphasis added, footnote omitted).

³ White Paper at 27-30.

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recognition that “regulators will always struggle to set the ‘right’ price,” and that “hopes and good intentions can’t override economic analysis and hard data. Micromanagement can thwart competition. It can stifle investment. It can prevent us from ever achieving long-term results that benefit consumers.”⁴ In that spirit, Hamilton believes that OED should be tasked with examining the current IP CTS rate methodology.

This filing is made in accordance with Section 1.1206(b)(1) of the Commission’s rules, 47 C.F.R. § 1.1206(b)(1). In the event that there are any questions concerning this matter, please contact the undersigned.

Respectfully submitted,
WILKINSON BARKER KNAUER, LLP

/s/ David A. O’Connor
Counsel for Hamilton Relay, Inc.

Attachment

cc (via e-mail): Zenji Nakazawa
Amy Bender
Jerry Ellig

⁴ *Business Data Services in an Internet Protocol Environment*, WC Docket No. 16-143; *Technology Transitions*, GN Docket No. 13-5; *Special Access for Price Cap Local Exchange Carriers*, WC Docket No. 05-25; *AT&T Corporation Petition for Rulemaking to Reform Regulation of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, RM-10593, Report and Order, FCC 17-39 (adopted Apr. 20, 2017) (separate statement of Chairman Pai, at 1).



Telecommunications Relay Services for Individuals who are Deaf or Hard of Hearing

Market and Policy Analyses

PREPARED FOR


Hamilton Relay

PREPARED BY

Coleman Bazelon, PhD

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August 30, 2017



This white paper was prepared for Hamilton Relay. All results and any errors are the responsibility of the authors and do not represent the opinion of The Brattle Group or its clients.

Acknowledgement: We acknowledge the valuable contributions of many individuals to this paper and to the underlying analysis, including members of The Brattle Group for peer review.

IMPORTANT NOTICE:

This white paper (“Paper”) was prepared at the request of Hamilton Relay (“Hamilton”) to enhance its understanding of the economic and regulatory issues surrounding certain aspects of the Telecommunication Relay Service (TRS) market. The Paper may be made available to the public; however, excerpts of the paper may not be attributed to us or The Brattle Group unless the Paper has been published in the public record as a complete work.

The Paper includes certain projections about the future of the TRS market that are necessarily based on assumptions with respect to conditions or events which may or may not arise or occur in the future. While we believe them to be reasonable for purposes of preparing the Paper, actual future outcomes are ultimately dependent upon future events that are outside of our control and therefore may differ, perhaps materially, from the scenario described. Other reasonable assumptions exist that could create different scenarios. We do not make any representation with respect to the likelihood of any specific future outcome and cannot and do not accept liability for losses suffered, whether direct or consequential, arising out of the failure of any specific scenario to be realized.

While the analyses described in the Paper may assist regulators and market participants in rendering informed decisions regarding the TRS market, they are not a substitute for the exercise of anyone’s own business judgment. Neither we nor Brattle will accept any liability under any theory for losses suffered, whether direct or consequential, arising from the reliance on the analyses presented, and cannot be held responsible if any conclusions drawn from this Paper should prove to be inaccurate.

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I. Introduction

This paper addresses the growth of the interstate Telecommunications Relay Services (TRS) Fund (the Fund) as the TRS program has added users and technologies since its creation by the Federal Communications Commission (FCC or the Commission) in 1993, pursuant to the Americans with Disabilities Act (ADA). In what follows, we carefully consider the economic and regulatory issues relating to the growth of the Fund, including inflation, demand trends, technological innovations, and jurisdictional shifts. We also examine methods for addressing the underlying drivers of the Fund's growth as well as alternative methods of rate determination. Additionally, we consider broader industry trends that have resulted in a declining Fund contribution base.

Our findings include:

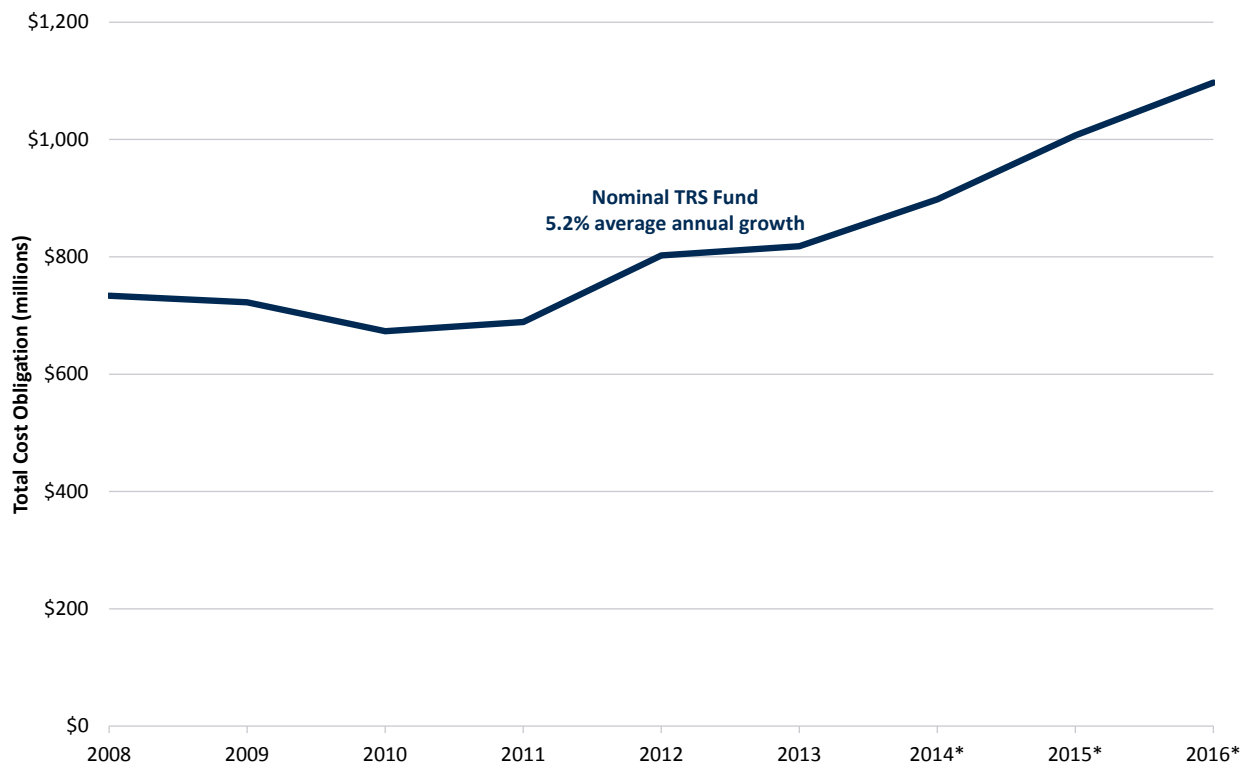
- The Fund's average annual growth rate of 5.2% is reduced to 3.2% after adjusting for inflation;
- The percentage of total minutes funded by the federal TRS Fund in 1999 was estimated to be about 21%, whereas the equivalent estimate for 2016 was 94%;
- The Fund's average annual growth rate is further reduced to 1.1% after controlling for shifts between state and federal jurisdictions;
- Consequently, 80% of the perceived growth in the Fund is due to inflation and shifts in jurisdictional funding obligations;
- Real (inflation-adjusted) reimbursement rates for IP CTS and VRS, which were projected to comprise roughly 97% of federally compensated minutes in the 2016-2017 rate-year, have not been trending upwards; hence, any real increase in the TRS Fund cannot be a result of the compensation rates;
- The Fund's modest growth is likely demand-driven;
- Demand increases are likely the result of shifts in market demographics and are consistent with broader market trends;
- The contribution base has been decreasing at an average annual rate of 4.8%, indicating that changes in the contribution factor are mostly driven by changes in the contribution base rather than the fund size;
- The MARS methodology is likely the best rate methodology given the structure and purpose of the TRS market.

II. Expansion of the TRS Fund

As seen in Figure 1, the Fund has grown, in nominal terms, over the last several years. This growth has caused concern among some interested parties who have suggested that measures should be taken to temper further growth.¹ However, this growth has mostly been caused by inflation and modal/jurisdictional shifts, coupled with a reasonable and anticipated growth in demand for TRS services. This demand is due to, among other things, an aging population and an increase in the hard-of-hearing population, as analyzed in Section II.B.1. These causes are related to general economic factors along with the growing success of the TRS program and do not support the need for changes in the IP CTS rate-setting methodology.

¹ IDT Telecom and the Ad Hoc Coalition of International Telecommunications Companies have both expressed concern. See, *e.g.*, Reply Comments of the Ad Hoc Coalition of International Telecommunications Companies, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket No. 03-123, FCC, February 11, 2016, p. 3, accessed July 19, 2017, <https://ecfsapi.fcc.gov/file/60001426604.pdf> and Petition for Rulemaking, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket No. 03-123, FCC, November 25, 2015, pp. 6-7, accessed July 19, 2017, <https://ecfsapi.fcc.gov/file/60001345008.pdf>.

Figure 1: Nominal Federal TRS Costs, 2008-2016



Notes: Years indicate rate-year starts. Consistent sourcing for historical TRS cost data for rate-years beginning 2008-2016 is not publicly available. Historical cost data for rate-years beginning 2008-2013 are reported by the U.S. Government Accountability Office (GAO). Costs for rate-years beginning in 2014-2016 are incurred costs for July-March and projections for April-June made by Rolka Loube in its Interstate TRS Fund Reports. This approach is necessitated by the particular construction of data reported by Rolka Loube. Data has been validated using FCC data on fiscal year expenditures. Although data for total TRS costs from earlier periods exists, we use the timeframe of 2008-2016 in order to coincide with the use of the MARS methodology, with the introduction of IP CTS, and with subsequent analyses, which are limited by the availability of state level data.

Sources: U.S. Government Accountability Office, "Telecommunications Relay Service - FCC Should Strengthen Its Management of Program to Assist Persons with Hearing or Speech Disabilities," GAO-15-409, April 2015, Data Table for Figure 2, p. 52, accessed July 20, 2017, <http://www.gao.gov/assets/680/670005.pdf> ("2015 GAO Report") and Rolka Loube LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, 2015-2017 ("Rolka Loube Interstate TRS Fund Reports, 2015-2017").

A. INFLATION AND MODAL/JURISDICTIONAL SHIFTS

Most of the increase in the TRS Fund can be explained by two factors: inflation and a shift in demand from state-funded to federally-funded modes of TRS. Both of these changes have increased federal costs, but are separable from increases in overall demand. (Minutes of use have

increased as well and will be discussed in the next section.) In fact, inflation and the modal/jurisdictional shifts fully explain 78.1% of the increase in the federal TRS Fund.²

One of the primary contributors to the expansion of the TRS Fund is simply increased costs of doing business, *i.e.*, inflation. When considering monetary figures over time, a measure of real value³ is more informative than nominal dollar figures; hence, a suitable adjustment for inflation

² National Exchange Carrier Association, Inc. (NECA), Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, 2009-2011 (“NECA Interstate TRS Fund Reports, 2009-2011”); Deaf and Disabled Telecommunications Program of California, “2008-2011 Consolidated Annual Report,” California Public Utilities Commission, 2012, p. 20, accessed June 15, 2017, http://ddtp.cpuc.ca.gov/uploadedFiles/New_Navigation_Structure/About_Us/ddtp_annual_2011_v10.pdf; Michigan Relay Center, “Advisory Board Annual Report 2008,” Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2008_273726_7.pdf; Michigan Relay Center, “Advisory Board Annual Report 2009,” Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2009_317011_7.pdf; Rolka Loube Interstate TRS Fund Reports, 2012-2017; U.S. Bureau of Labor Statistics, “Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG],” Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>; “State Population Totals Tables: 2010-2016,” U.S. Census Bureau, January 18, 2017, accessed June 15, 2017, <https://www.census.gov/data/tables/2016/demo/popest/state-total.html>; and “Intercensal Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2010,” U.S. Census Bureau, November 30, 2016, accessed June 15, 2017, <https://www2.census.gov/programs-surveys/popest/tables/>; U.S. Government Accountability Office (GAO), “Telecommunications Relay Service - FCC Should Strengthen Its Management of Program to Assist Persons with Hearing or Speech Disabilities,” GAO-15-409, April 2015, Data Table for Figure 2, p. 52, accessed July 20, 2017, <http://www.gao.gov/assets/680/670005.pdf> (“2015 GAO Report”). The GAO report serves as a consolidated source of TRS data. The report was commissioned “to examine FCC’s management of the TRS program. Th[e] report examines, among other things, (1) changes in TRS services and costs since 2002, (2) FCC’s TRS performance goals and measures and how they compare with key characteristics of successful performance goals and measures, and (3) the extent to which the design of the program’s internal control system identifies and considers program risks.” 2015 GAO Report, Highlights.

³ Inflation refers to the increase in the dollar cost of a given good or service over time. The term “real” refers to a monetary value that has been adjusted for inflation. When evaluating changes in monetary figures over time, one expects a portion of those changes to stem from inflation, and that inflation obscures a more meaningful comparison over time. In this paper we use the Employment Cost Index, known as the ECI, (further described in Footnote 5) to adjust for inflation. Hence the terms “Real” and “ECI-Adjusted” are synonymous.

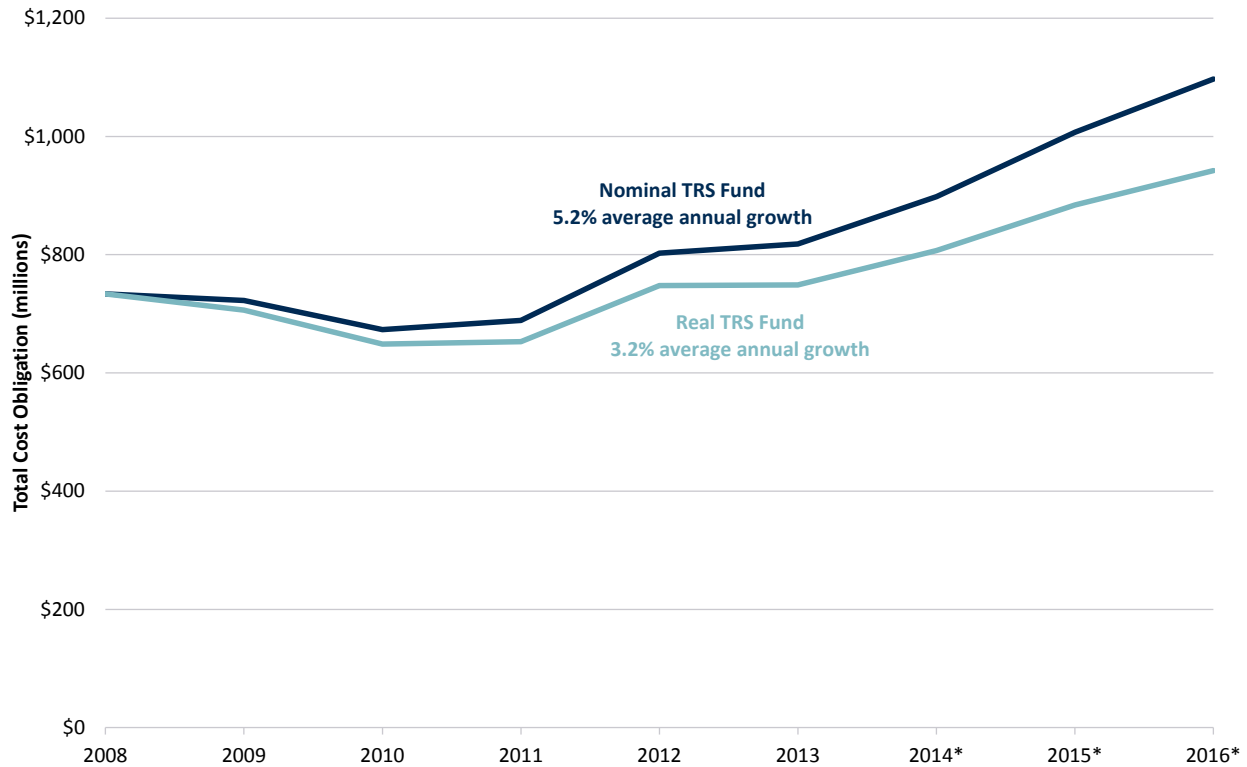
is necessary. The primary cost to TRS providers is labor.⁴ Consequently, a labor-based inflation adjustment such as the Employment Cost Index (ECI) is appropriate.⁵ Using the ECI, we have adjusted nominal TRS Fund expenditures to be expressed in constant 2008 dollars. The eight-year total growth in the fund of 49.5% in nominal terms is reduced to 28.4% when inflation is accounted for. That is, 42.6% of the entire growth of the fund is accounted for by inflation. Moreover, in real terms, the Fund has only realized an average annual growth rate of 3.2%, down from 5.2% in nominal terms.⁶ Figure 2 shows annual Fund expenditures in both nominal and real (constant 2008 dollar) terms.

⁴ The primary costs of TRS providers are salaries and benefits for communications assistants. Rolka Loube Saltzer Associates LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities; Structure and Practices of the Video Relay Service Program*, CG Docket No. 03-123 and CG Docket No. 10-51, FCC, May 1, 2013, p. 23, accessed July 19, 2017, <https://ecfsapi.fcc.gov/file/7022307987.pdf>.

⁵ The ECI is an index used to adjust for inflation in industries where labor costs are substantial.

⁶ 2015 GAO Report, Data Table for Figure 2, p. 52; Rolka Loube Interstate TRS Fund Reports, 2015-2017; and U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>.

Figure 2: Nominal and Real (ECI-Adjusted) Federal TRS Costs, 2008-2016



Notes: Years indicate rate-year starts. Consistent sourcing for historical TRS cost data for rate-years beginning 2008-2016 is not publicly available. Historical cost data for rate-years beginning 2008-2013 are reported by the GAO. Costs for rate-years beginning in 2014-2016 are incurred costs for July-March and projections for April-June made by Rolka Loube in its Interstate TRS Fund Reports.

Sources: 2015 GAO Report, Data Table for Figure 2, p. 52; Rolka Loube Interstate TRS Fund Reports, 2015-2017; and U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>.

Shifts in the modes of TRS being provided and the related jurisdictional shifts in funding are also driving factors behind an ostensibly growing TRS Fund. Demand has shifted from Internet Protocol Relay (IP Relay) and Traditional Text-Telephone (TTY) to IP Captioned Telephone Service (IP CTS) and Video Relay Service (VRS),⁷ which were expected to constitute a combined

⁷ IP Relay callers use the internet to connect with a communications assistant who reads text messages aloud or types verbal messages as necessary. TTY services are similar but make use of traditional telephone services rather than the internet. IP CTS uses an internet connection to reach a communications assistant who provides real-time captioning of a conversation using speech recognition technology. VRS works similarly to IP Relay but uses American Sign Language (ASL) over video rather than text. "Telecommunications Relay Service (TRS)," FCC, October 25, 2016, accessed July 20, 2017, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>.

97% of federal demand (in minutes) in the 2016-2017 rate-year.⁸ In contrast, IP CTS and VRS constituted only 59% of the federal market (in minutes) in 2009.⁹ This is significant for two reasons. First, a shift to IP CTS and VRS represents a jurisdictional shift in funding responsibility. IP CTS and VRS, like all IP-based modes of TRS, are funded at the federal level, regardless of whether a call is interstate or intrastate. This is because it was and in some cases still is not technologically feasible to determine the origin of IP calls, and therefore intrastate and interstate IP calls may not be distinguishable from one another.¹⁰ This shift to IP-based relay services has been consistent with the overall shift to IP-based technology and away from legacy networks.¹¹ For several years, both the telecommunications industry and the FCC Chairman have been welcoming the rapid transition to IP, indicative of the wide-ranging support for an IP-based future.¹²

⁸ Projected demand for the current rate-year, 2017-2018, was incomplete and therefore not used in this calculation. Rolka Loubé Interstate TRS Fund Report, 2016 and Rolka Loubé Interstate TRS Fund Performance Status Report, May and June 2017, accessed July 13, 2017, <http://www.rolkaloubé.com/formsreports> (“Rolka Loubé Interstate TRS Fund Performance Status Report, May and June 2017”).

⁹ The FCC indicated that IP CTS data prior to July 2009 either “[does] not exist or [is] not reliable.” 2015 GAO Report, Note to Figure 4 at p. 13 and Data Table for Figure 5 at pp. 14 and 53-54.

¹⁰ Declaratory Ruling, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Internet-based Captioned Telephone Service*, CG-Docket No. 03-123, FCC, January 11, 2007, ¶¶ 5-6 and 25, accessed July 20, 2017, https://apps.fcc.gov/edocs_public/attachmatch/FCC-06-182A1.pdf.

¹¹ See, e.g., Jon Brodtkin, “‘The Telephone Network is Obsolete’: Get Ready for the All-IP Telco,” *Ars Technica*, January 7, 2013, accessed July 31, 2017, <https://arstechnica.com/information-technology/2013/01/the-telephone-network-is-obsolete-get-ready-for-the-all-ip-telco>.

¹² See, e.g., “Statement of Commissioner Ajit Pai on the IP Transition Presentation,” FCC, June 13, 2014, accessed August 1, 2017, https://apps.fcc.gov/edocs_public/attachmatch/DOC-327631A1.pdf; Mike Dano, “FCC Votes to Streamline Process for Operators to Transition from TDM to IP Services,” *FierceTelecom*, July 14, 2016, accessed July 31, 2017, <http://www.fiercetelecom.com/telecom/fcc-votes-to-streamline-process-for-operators-to-transition-from-tdm-to-ip-services>; and Jon Brodtkin, “‘The Telephone Network is Obsolete’: Get Ready for the All-IP Telco,” *Ars Technica*, January 7, 2013, accessed July 31, 2017, <https://arstechnica.com/information-technology/2013/01/the-telephone-network-is-obsolete-get-ready-for-the-all-ip-telco>.

In contrast, non-IP-based modes of TRS are funded by states when calls are intrastate and by the federal TRS Fund when calls are interstate.¹³ Approximately 27.1% of call minutes were funded at the state level in 2008, compared to only 6.3% in 2016. This is not the result of diminished intrastate usage in any real sense, but instead is the result of geographically intrastate relay calls being treated as interstate from a jurisdictional perspective. Consequently, this shift from state to federal funding translates into an approximately 2% annual increase in the federal TRS Fund. Figure 3 and Figure 4 show how total (state and federal) TRS costs have changed over time. Although not depicted in the figures, funding obligations have been shifting from the state level to the federal level since well before 2008. In fact, the number of minutes funded by the federal TRS Fund in 1999 was estimated to be about 21%.¹⁴ In 2016, the equivalent measure was estimated to be approximately 94%.¹⁵ That is, *the portion of overall funding under federal responsibility more than quadrupled between 1999 and 2016.*

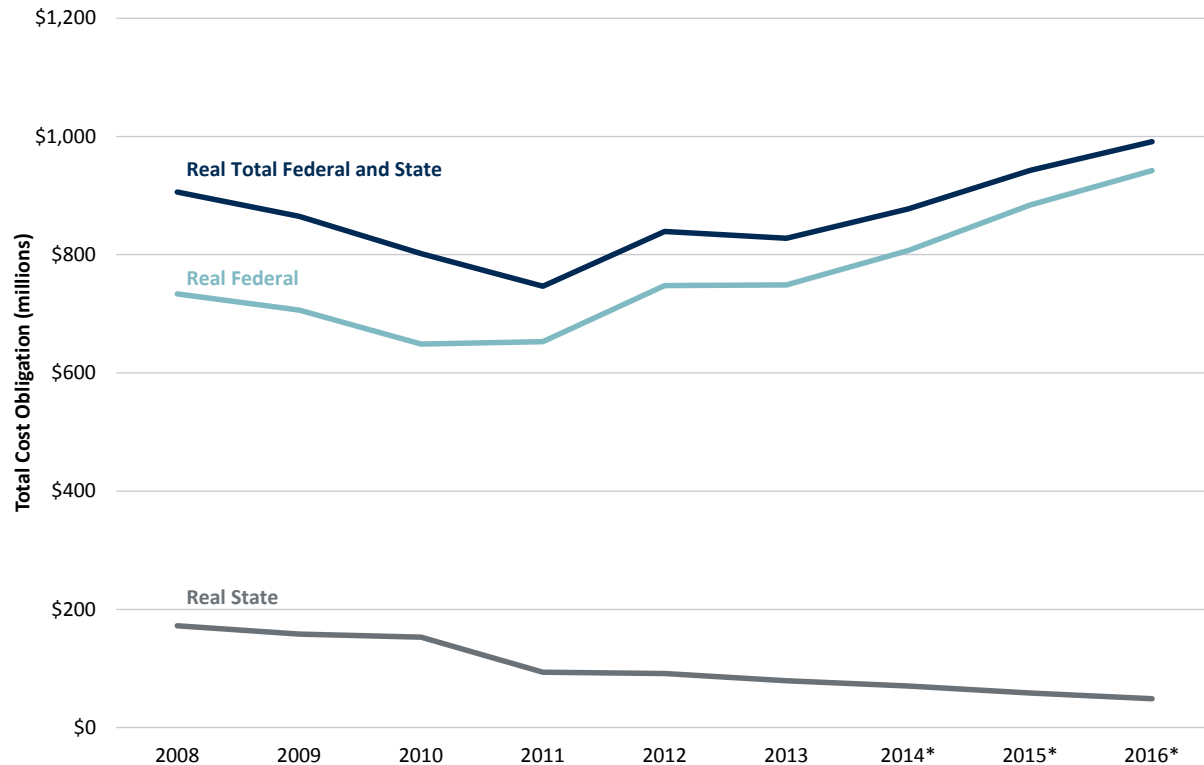
The corresponding changes in state and federal funding depicted in Figure 3 and Figure 4 demonstrate a shift in the source of TRS payments, as much of the increase in federal funding is offset by decreased state funding, with only a small increase in total expenditures over time. After controlling for the shift from state to federal funding, the real average annual growth rate is about 1.1%, down from 3.2% (in real terms).

¹³ Declaratory Ruling, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Internet-based Captioned Telephone Service*, CG-Docket No. 03-123, FCC, January 11, 2007, ¶ 3, accessed July 20, 2017, https://apps.fcc.gov/edocs_public/attachmatch/FCC-06-182A1.pdf.

¹⁴ A 1998 NECA Interstate TRS Fund Report estimated that in 1999, 20.6% of total TRS call minutes would be funded at the federal level. Calculation: $20.6\% = 41,880,207 \text{ Interstate Conversation Minutes} / 202,894,967 \text{ Total Minutes}$. NECA Interstate TRS Fund Report, 1998, Exhibit 1.

¹⁵ Calculation: $93.7\% = 381,807,000 \text{ Federal TRS Minutes} / 407,293,124 \text{ Total Minutes}$.

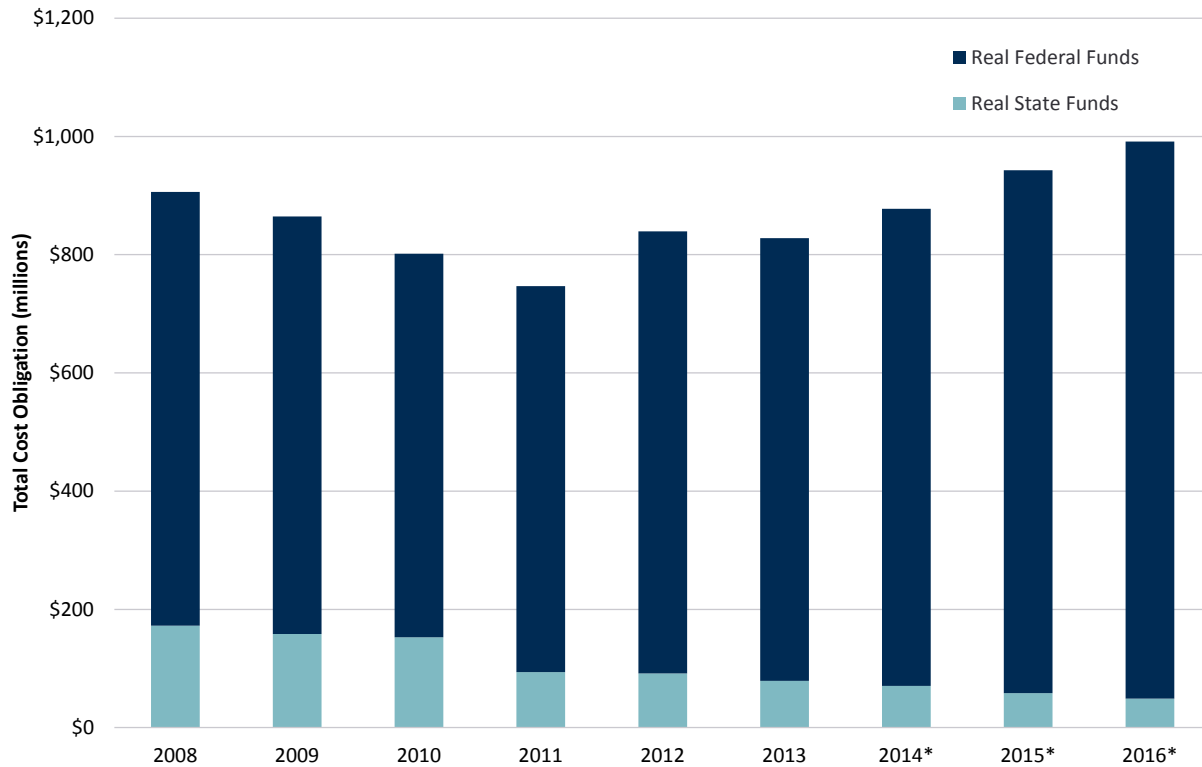
Figure 3: State, Federal, and Combined TRS Real (ECI-Adjusted) Costs, 2008-2016



Notes: Years indicate rate-year starts. Consistent sourcing for historical federal TRS cost data for rate-years beginning 2008-2016 is not publicly available. Historical federal cost data for rate-years beginning 2008-2013 are reported by the GAO. Federal costs for rate-years beginning in 2014-2016 are incurred costs for July-March and projections for April-June made by Rolka Loube in its Interstate TRS Fund Reports.

Sources: 2015 GAO Report, Data Table for Figure 2, p. 52; National Exchange Carrier Association, Inc. (NECA), Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, 2009-2011 ("NECA Interstate TRS Fund Reports, 2009-2011"); Deaf and Disabled Telecommunications Program of California, "2008-2011 Consolidated Annual Report," California Public Utilities Commission, 2012, p. 20, accessed June 15, 2017, http://ddtp.cpuc.ca.gov/uploadedFiles/New_Navigation_Structure/About_Us/ddtp_annual_2011_v10.pdf; Michigan Relay Center, "Advisory Board Annual Report 2008," Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2008_273726_7.pdf; Michigan Relay Center, "Advisory Board Annual Report 2009," Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2009_317011_7.pdf; Rolka Loube Interstate TRS Fund Reports, 2012-2017; U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>; "State Population Totals Tables: 2010-2016," U.S. Census Bureau, January 18, 2017, accessed June 15, 2017, <https://www.census.gov/data/tables/2016/demo/popest/state-total.html>; and "Intercensal Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2010," U.S. Census Bureau, November 30, 2016, accessed June 15, 2017, <https://www2.census.gov/programs-surveys/popest/tables/>.

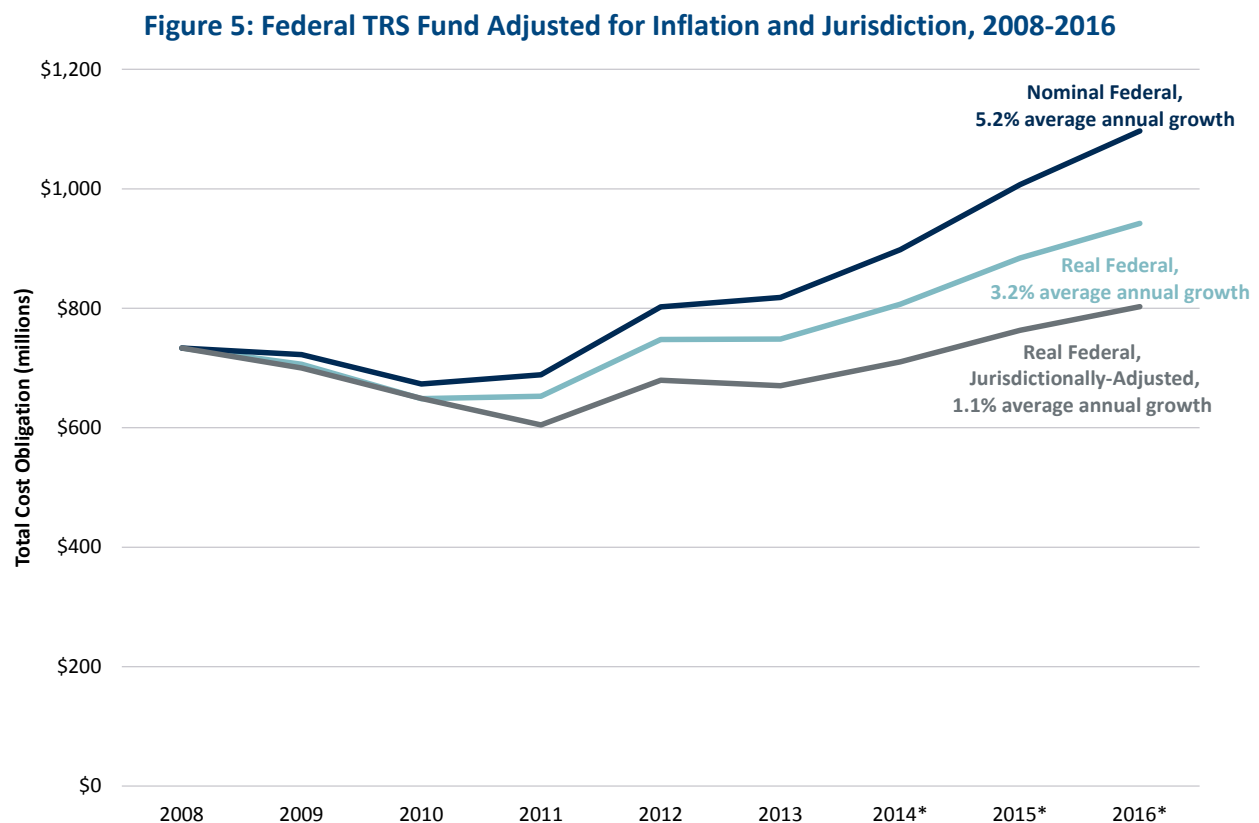
Figure 4: State and Federal TRS Real (ECI-Adjusted) Costs, 2008-2016



Notes: Bars show the total combined funding from federal and state sources as well as the distribution between state and federal sources. Years indicate rate-year starts. Consistent sourcing for historical federal TRS cost data for rate-years beginning 2008-2016 is not publicly available. Historical federal cost data for rate-years beginning 2008-2013 are reported by the GAO. Federal costs for rate-years beginning in 2014-2016 are incurred costs for July-March and projections for April-June made by Rolka Loube in its Interstate TRS Fund Reports.

Sources: 2015 GAO Report, Data Table for Figure 2, p. 52; National Exchange Carrier Association, Inc. (NECA), Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, 2009-2011 ("NECA Interstate TRS Fund Reports, 2009-2011"); Deaf and Disabled Telecommunications Program of California, "2008-2011 Consolidated Annual Report," California Public Utilities Commission, 2012, p. 20, accessed June 15, 2017, http://ddtp.cpuc.ca.gov/uploadedFiles/New_Navigation_Structure/About_Us/ddtp_annual_2011_v10.pdf; Michigan Relay Center, "Advisory Board Annual Report 2008," Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2008_273726_7.pdf; Michigan Relay Center, "Advisory Board Annual Report 2009," Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2009_317011_7.pdf; Rolka Loube Interstate TRS Fund Reports, 2012-2017; U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>; "State Population Totals Tables: 2010-2016," U.S. Census Bureau, January 18, 2017, accessed June 15, 2017, <https://www.census.gov/data/tables/2016/demo/popest/state-total.html>; and "Intercensal Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2010," U.S. Census Bureau, November 30, 2016, accessed June 15, 2017, <https://www2.census.gov/programs-surveys/popest/tables/>.

These results suggest that of the 5.2% nominal increase in the federal TRS Fund, about 2 percentage points are the result of inflation and 2 percentage points are the result of nothing more than a state-to-federal shift in costs.¹⁶ Jurisdictional shifts and inflation combined account for about 4 percentage points of the federal fund's 2008-2016 average annual growth, which, as discussed earlier, represents approximately 80% of the nominal increase in the federal TRS Fund. That is to say, after adjusting for inflation and the shift away from state funding, only one-fifth of the perceived increase in the Fund remains. The incremental effects of inflation and jurisdictional shifts are illustrated in Figure 5.



Notes: Years indicate rate-year starts. Consistent sourcing for historical federal TRS cost data for rate-years beginning 2008-2016 is not publicly available. Historical federal cost data for rate-years beginning 2008-2013 are reported by the GAO. Federal costs for rate-years beginning in 2014-2016 are incurred costs for July-March and projections for April-June made by Rolka Loube in its Interstate TRS Fund Reports. To adjust for jurisdiction, we hold the federal portion of combined state and federal TRS costs constant at the 2008-2009 level, 81%.

Sources: 2015 GAO Report, Data Table for Figure 2, p. 52; NECA Interstate TRS Fund Reports, 2009-2011; Deaf and Disabled Telecommunications Program of California,

¹⁶ Calculations: 5.16% (average annual nominal TRS Fund growth) – 1.98% (inflation effect) – 2.05% (jurisdiction effect) = 1.13% (jurisdictionally-adjusted real TRS Fund growth).

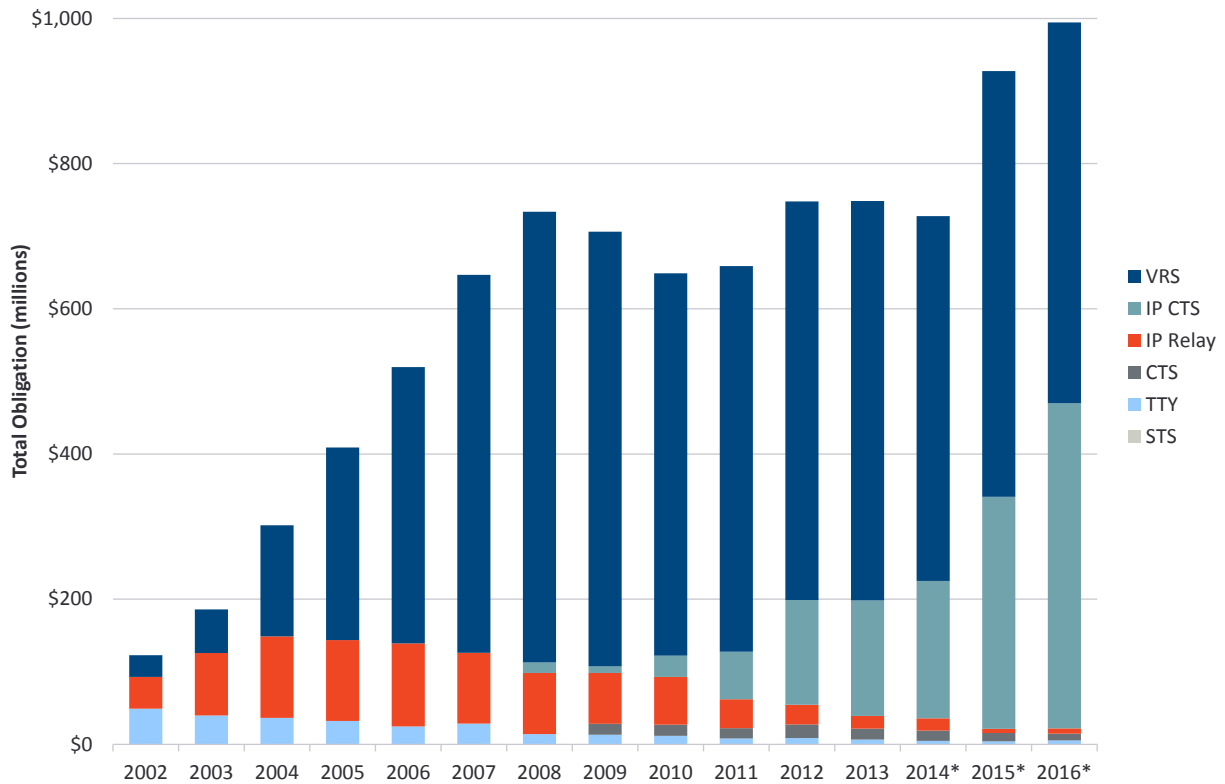
"2008-2011 Consolidated Annual Report," California Public Utilities Commission, 2012, p. 20, accessed June 15, 2017, http://ddtp.cpuc.ca.gov/uploadedFiles/New_Navigation_Structure/About_Us/ddtp_annual_2011_v10.pdf; Michigan Relay Center, "Advisory Board Annual Report 2008," Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2008_273726_7.pdf; Michigan Relay Center, "Advisory Board Annual Report 2009," Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2009_317011_7.pdf; Rolka Loube Interstate TRS Fund Reports, 2012-2017; U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>; "State Population Totals Tables: 2010-2016," U.S. Census Bureau, January 18, 2017, accessed June 15, 2017, <https://www.census.gov/data/tables/2016/demo/popest/state-total.html>; and "Intercensal Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2010," U.S. Census Bureau, November 30, 2016, accessed June 15, 2017, <https://www2.census.gov/programs-surveys/popest/tables/>.

The second reason the modal shift is significant is that VRS is substantially more costly to the Fund on a per-minute basis than other forms of TRS, with a projected per-minute rate 100% greater than the average per-minute rate of other TRS services in the 2016-2017 rate-year.¹⁷ As a result, VRS was expected to receive 56% of the Fund, even though it was expected to constitute only 36% of the minutes used in the same rate-year.¹⁸ Figure 6 shows TRS costs by service category over time, which can be compared to TRS demand by service category over time in Figure 7.

¹⁷ For TRS categories for which data is incomplete in these years, projections as reported in monthly Rolka Loube Interstate TRS Fund Performance Status Reports are used. Rolka Loube Annual Report, 2016 and U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>.

¹⁸ For TRS categories for which data is incomplete in these years, projections as reported in monthly Rolka Loube Interstate TRS Fund Performance Status Reports are used. Rolka Loube Annual Report, 2016 and U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>.

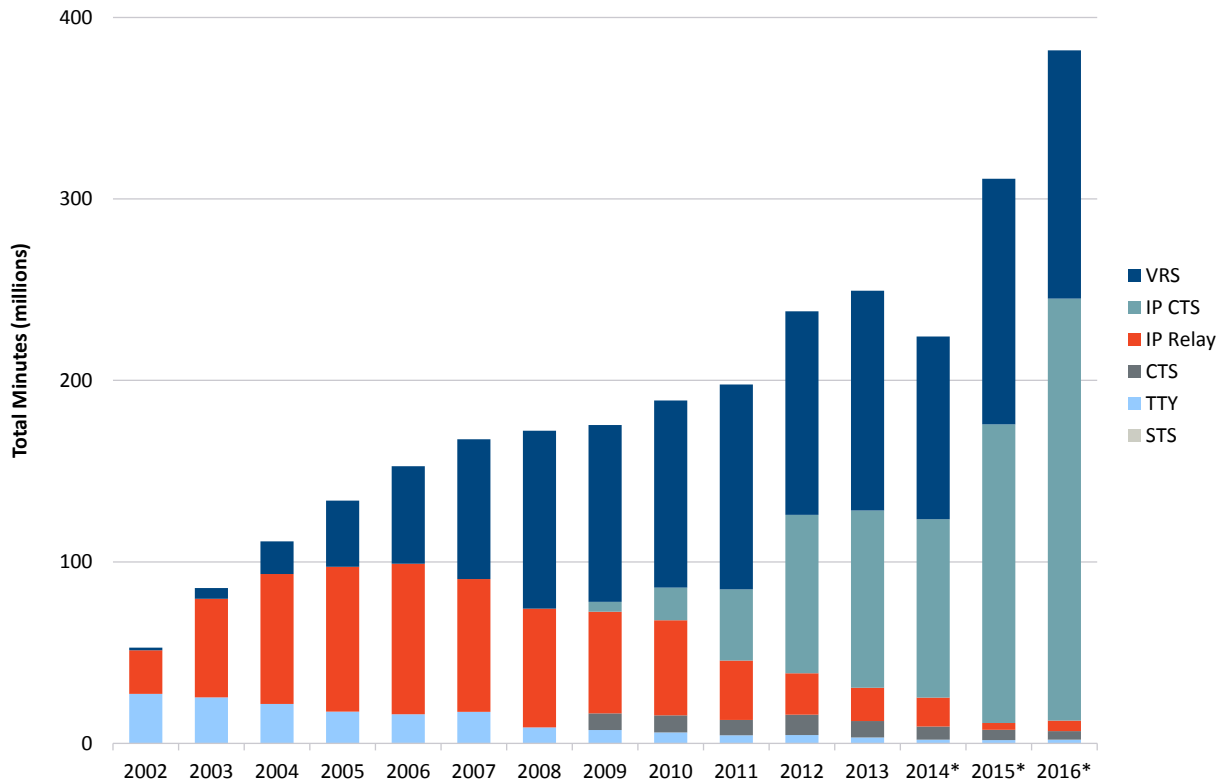
Figure 6: Federal TRS Program Real (ECI-Adjusted) Costs by Service Category, 2002-2016



Notes: Years indicate rate-year starts. Consistent sourcing for historical TRS service-specific cost data for rate-years beginning 2002-2016 is not publicly available. Historical cost data for rate-years beginning 2002-2013 are reported by the GAO. Costs for rate-years beginning in 2014-2016 are projections made by Rolka Loube in its Interstate TRS Fund Reports. For TRS categories for which data is incomplete in these years, projections as reported in monthly Rolka Loube Interstate TRS Fund Performance Status Reports are used.

Sources: 2015 GAO Report, Data Table for Figure 4, p. 53; Rolka Loube Annual Reports, 2014-2016; Rolka Loube, Interstate TRS Fund Performance Status Reports, <http://www.rolkaloube.com/formsreports> ("Rolka Loube Monthly TRS Fund Status Reports"); and U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>.

Figure 7: Federal TRS Program Demand by Service Category, 2002-2016



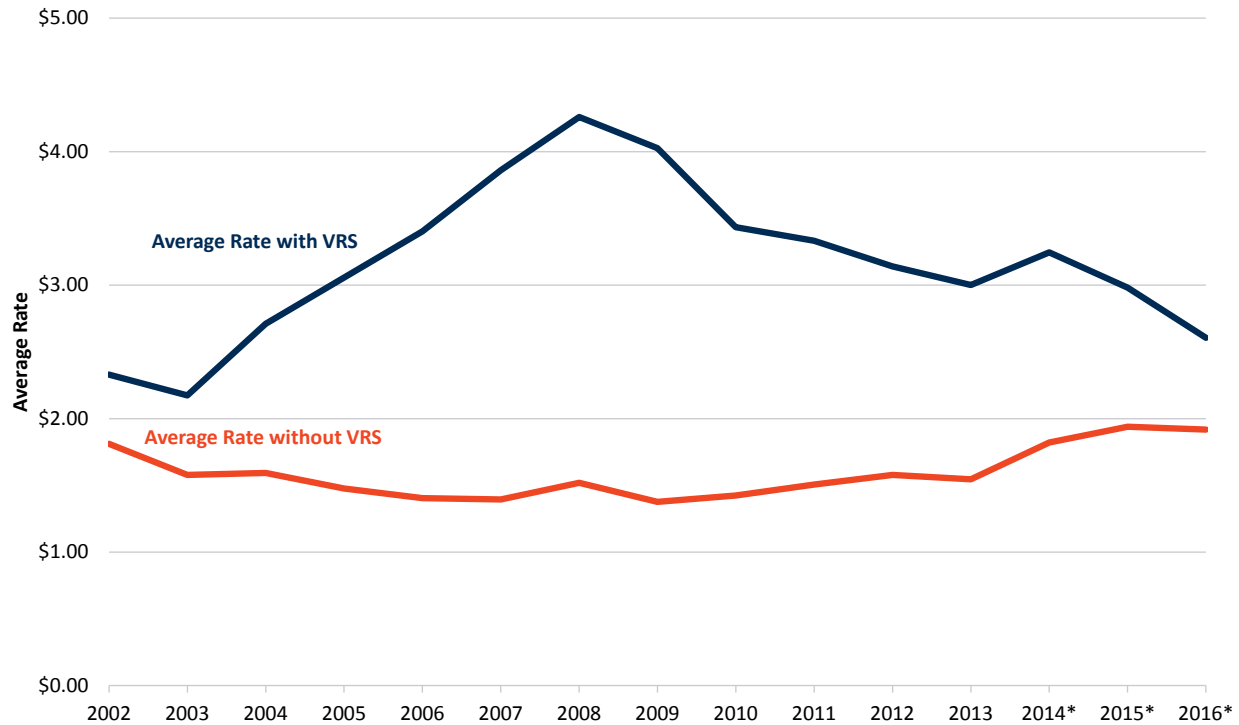
Notes: Years indicate rate-year starts. Consistent sourcing for historical TRS service-specific minute data for rate-years beginning 2002-2016 is not publicly available. Historical minute data for rate-years beginning 2002-2013 are reported by the GAO. Minutes for rate-years beginning in 2014-2016 are projections made by Rolka Loube in its Interstate TRS Fund Reports. For TRS categories for which data is incomplete in these years, projections as reported in monthly Rolka Loube Interstate TRS Fund Performance Status Reports are used.

Sources: 2015 GAO Report, Data Table for Figure 5, pp. 53-54; Rolka Loube Annual Reports, 2014-2016; and Rolka Loube Monthly TRS Fund Status Reports.

From this it is clear that a substantial portion of funding is shifting towards VRS. Figure 8 depicts both the average cost per minute across all TRS services and the same average cost per minute when VRS is excluded. From this it is clear that the shift towards VRS starting around 2003 caused the average compensation rate to increase, as the average rate excluding VRS is stable over time. It is also clear that the average rate across all TRS modes has been declining in recent years, bringing the 2016 average rate down to approximately 2004 levels.¹⁹

¹⁹ See Figure 8.

Figure 8: Federal TRS Program Average Real (ECI-Adjusted) Rates Across TRS Types With and Without VRS, 2002-2016



Notes: The Average Rate without VRS consists of the following TRS types: TTY, STS, CTS, IP CTS, and IP Relay. Years indicate rate-year starts. Consistent sourcing for historical TRS service-specific cost and minute data for rate-years beginning 2002-2016 is not publicly available. Rates for rate-years beginning 2002-2013 are based on cost and minute data reported by the GAO. Rates for 2014-2016 are based on projections of costs and minutes made by Rolka Loube in its Interstate TRS Fund Reports. For TRS categories for which data is incomplete in these years, projections as reported in monthly Rolka Loube Interstate TRS Fund Performance Status Reports are used.

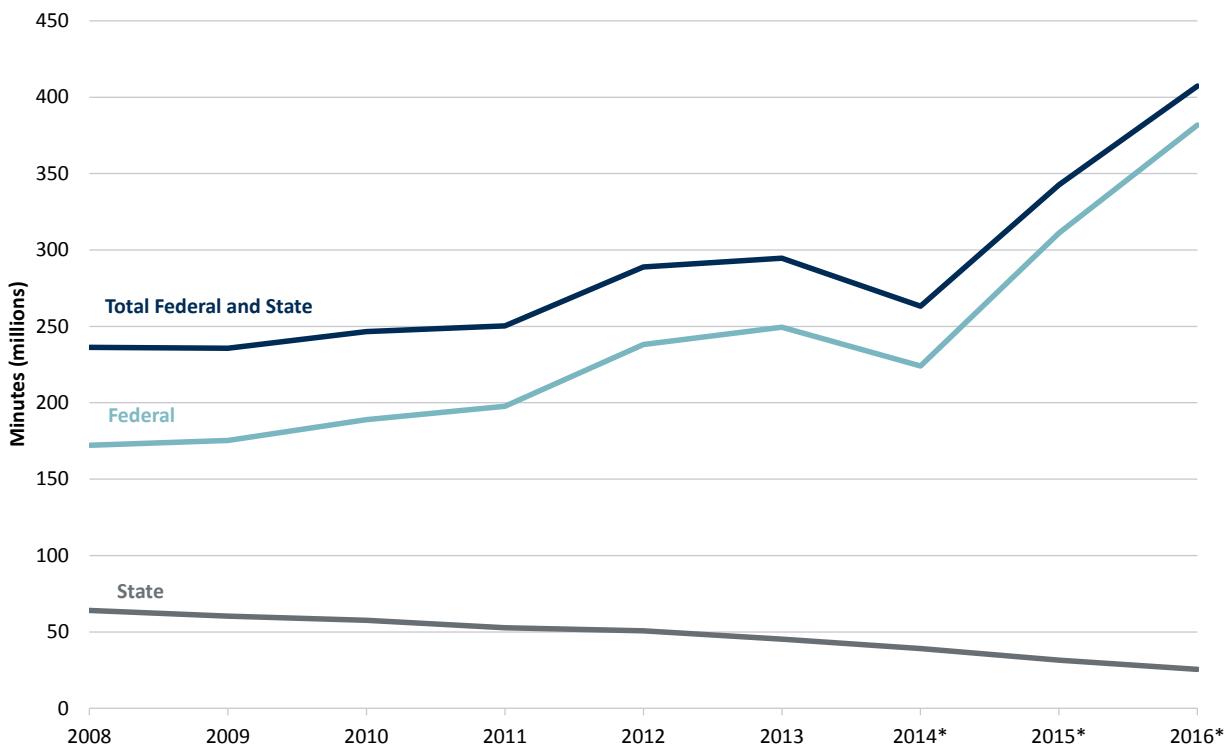
Sources: 2015 GAO Report, Data Table for Figure 5, pp. 53-54; Rolka Loube Annual Reports, 2014-2016; Rolka Loube Monthly TRS Fund Status Reports; and U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>.

B. TRS DEMAND TRENDS

The remaining increase in the Fund is accounted for by an increase in federally funded TRS minutes of use. As seen in Figure 9, total TRS demand has increased over time in terms of minutes used. The average annual growth rate of TRS usage (combined state and federal) since 2008 has been 7.0%. This increased demand is likely the primary driver for the 1.1% real growth in federal TRS funding obligations. However, as discussed below, increased TRS demand is consistent with demographic trends in the TRS market. Therefore, increased demand is likely not indicative of some sort of over-provision of service, but rather is the result of external factors. Moreover, it is worth reiterating that although TRS minutes have been trending up, the average

cost per minute has been trending down, as depicted in Figure 8, mitigating the net effect of growing demand on the Fund.

Figure 9: Total TRS Program Minutes, 2008-2016



Notes: Years indicate rate-year starts. Consistent sourcing for historical federal TRS minute data for rate-years beginning 2008-2016 is not publicly available. Historical federal minute data for rate-years beginning 2008-2013 are reported by the GAO. Federal minutes for rate-years beginning 2014-2016 are projections made by Rolka Loube in its Interstate TRS Fund Reports. For TRS categories for which data is incomplete in these years, projections as reported in monthly Rolka Loube Interstate TRS Fund Performance Status Reports are used.

Sources: 2015 GAO Report, Data Table for Figure 5, pp. 53-54; NECA Interstate TRS Fund Reports, 2009-2011; Rolka Loube Interstate TRS Fund Reports, 2012-2017; Rolka Loube Monthly TRS Fund Status Reports; California Public Utilities Commission, 2012, p. 20, accessed June 15, 2017, http://ddtp.cpuc.ca.gov/uploadedFiles/New_Navigation_Structure/About_Us/ddtp_annual_2011_v10.pdf; U.S. Census Bureau, "State Population Totals Tables: 2010-2016," January 18, 2017, accessed June 15, 2017, <https://www.census.gov/data/tables/2016/demo/popest/state-total.html>; and U.S. Census Bureau, "Intercensal Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2010," November 30, 2016, accessed June 15, 2017, <https://www2.census.gov/programs-surveys/popest/tables/>.

The purpose of the Fund is to ensure that individuals who are deaf, hard-of-hearing, deaf-blind, or have difficulty speaking are served by assisting them with telephonic communications that are

functionally equivalent to those used by hearing individuals.²⁰ To a large extent, the increase in usage of the Fund over time is reflective of the increased need for TRS services and the success in meeting that need.

1. Aging Population Increases the Number of Consumers Who Are Hard of Hearing

Between 2008 and 2016, the portion of the U.S. population 65 and older grew by 17.5%.²¹ Given that approximately one-third of Americans between the ages of 65 and 74 experience hearing loss and almost half of all Americans over the age of 75 experience hearing loss, the portion of the population with age-related hearing loss increased by approximately 14.7% over the same period of time.²² This trend is expected to continue. As the population ages in the coming

²⁰ “Telecommunications Relay Service (TRS),” FCC, October 25, 2016, accessed July 20, 2017, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>; Report and Order, Notice of Inquiry, Further Notice of Proposed Rulemaking, and Order, *In the Matter of Structure Practices of the Video Relay Service Program and Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket Nos. 10-51 and 03-123, FCC, March 23, 2017, ¶ 2, accessed July 25, 2017, https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-26A1.pdf; and “Title IV of the Americans with Disabilities Act (Section 255),” FCC, accessed July 26, 2017, <https://www.fcc.gov/general/title-iv-ada>.

²¹ Calculation: $17.5\% = (15.2\% - 13.0\%) / 13.0\%$. Calculations as displayed in footnotes may not be exact due to rounding. “Projections of the Total Resident Population by 5-Year Age Groups, and Sex with Special Age Categories: Middle Series, 2006 to 2010,” U.S. Census Bureau, January 13, 2000, accessed July 20, 2017, <https://www2.census.gov/programs-surveys/popproj/tables/2000/2000-national-summary-tables/np-t3-c.txt> and “Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties, and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2016,” U.S. Census Bureau, June 2017, accessed July 20, 2017, https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2016_PEPAGE_SEX&prodType=table.

²² Note that this estimate only accounts for those with age-related hearing loss. When accounting for other segments of the deaf and hard-of-hearing communities, the population increase would likely be larger. “Age-Related Hearing Loss,” National Institute on Deafness and Other Communication Disorders (NIDCD), June 29, 2017, accessed July 20, 2017, <https://www.nidcd.nih.gov/health/age-related-hearing-loss>; “Projections of the Total Resident Population by 5-Year Age Groups, and Sex with Special Age Categories: Middle Series, 2006 to 2010,” U.S. Census Bureau, January 13, 2000, accessed June 26, 2017, <https://www2.census.gov/programs-surveys/popproj/tables/2000/2000-national-summary-tables/np-t3-c.txt>; and “Annual Estimates of the Resident Population for Selected Age Groups by Sex for the United States, States, Counties, and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2016,” U.S. Census Bureau, June 2017, accessed June 26, 2017,

decades, largely due to the baby boomer generation reaching retirement age, the portion of the population with hearing loss will continue to grow.²³ Between 2016 and 2060, the portion of the U.S. population 65 and older is projected to increase by 54.4%.²⁴ At the current rates, this corresponds to one in ten Americans with hearing loss by 2060.²⁵ While providing future TRS service to such a large portion of the populace may be costly, timely investment in research and development (R&D) would likely reduce future costs and soften the impact. For example, increased demand will very likely increase the number of Communications Assistants (CAs) required and the wages that those CAs can command. Encouraging (or at least not discouraging) the relay industry to invest in R&D of specialized technology may help reduce the involvement of CAs for some types of calls in the future, thereby potentially alleviating some of the future budgetary and labor constraints.

2. Improving Technology Increases Adoption

Captioned telephone technology was authorized as a compensable relay service in 2003, an advancement that allowed for the near simultaneous transmission of voice and corresponding captioned text.²⁶ This technology is ideal for hard-of-hearing individuals who can hear at some

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https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=PEP_2016_PEPAGE_SEX&prodType=table.

²³ “Baby Boomers Retire,” Pew Research Center, December 29, 2010, accessed July 20, 2017, <http://www.pewresearch.org/fact-tank/2010/12/29/baby-boomers-retire/> and 2015 GAO Report, p. 12.

²⁴ “Table 1. Projected Population by Single Year of Age, Sex, Race, and Hispanic Origin for the United States: 2014 to 2060,” 2014 National Population Projections Datasets, U.S. Census Bureau, accessed July 20, 2017, <https://www.census.gov/data/datasets/2014/demo/popproj/2014-popproj.html>.

²⁵ Calculation: $9.9\% = ((1/3) * (45,773,596 \text{ Americans } 65\text{-}74 \text{ years old}) + (1/2) * (52,390,151 \text{ Americans } 75 \text{ years or older})) / 416,794,610 \text{ Americans}$. “Age-Related Hearing Loss,” National Institute on Deafness and Other Communication Disorders (NIDCD), June 29, 2017, accessed July 20, 2017, <https://www.nidcd.nih.gov/health/age-related-hearing-loss> and “Table 1. Projected Population by Single Year of Age, Sex, Race, and Hispanic Origin for the United States: 2014 to 2060,” 2014 National Population Projections Datasets, U.S. Census Bureau, accessed July 20, 2017, <https://www.census.gov/data/datasets/2014/demo/popproj/2014-popproj.html>.

²⁶ “Connectivity Through Sound: A Brief History of Captioned Phones,” The Hearing Review, March 10, 2010, accessed July 20, 2017, <http://www.hearingreview.com/2010/03/connectivity-through-sound-a-brief-history-of-captioned-phones/>.

level.²⁷ Prior to this, hard-of-hearing individuals were limited to text-only based TRS forms—such as TTY and IP Relay—or VRS.²⁸ Traditional TTY and IP Relay services are similar in that they both require an individual to contact a relay center in order to be connected with a CA.²⁹ For TTY, this call is made using a TTY phone, while the IP Relay connection is made through the internet.³⁰ In both cases, the CA will verbalize what a text user has typed and will type what a voice user has said.³¹ As a result of the relay process for these types of calls, some aspects of communications related to tone and inflection are lost.³² While VRS also relies on relay, the relay is done over video on the internet using American Sign Language (ASL) rather than text.³³ However, many individuals who experience hearing loss later in life do not use sign language. Consequently, CTS became a viable and valuable resource to a large portion of the hard-of-hearing community which was previously underserved.

Captioned telephone equipment technologies have also improved over time. Today, captioned phones are available that connect to the internet, feature Bluetooth compatibility, speakerphone, touch screens, large fonts, braille for the blind and hard-of-hearing, and other options that are unavailable through other forms of relay.³⁴ Captioning applications are also available for both iOS and Android smartphones, allowing people to use them regardless of location.³⁵ IP CTS

²⁷ “Connectivity Through Sound: A Brief History of Captioned Phones,” The Hearing Review, March 10, 2010, accessed July 20, 2017, <http://www.hearingreview.com/2010/03/connectivity-through-sound-a-brief-history-of-captioned-phones/>.

²⁸ See Figure 6 and Figure 7.

²⁹ “Telecommunications Relay Service (TRS),” FCC, October 25, 2016, accessed July 20, 2017, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>.

³⁰ “Telecommunications Relay Service (TRS),” FCC, October 25, 2016, accessed July 20, 2017, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>.

³¹ “Telecommunications Relay Service (TRS),” FCC, October 25, 2016, accessed July 20, 2017, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>.

³² “Telecommunications Relay Service (TRS),” FCC, October 25, 2016, accessed July 20, 2017, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>.

³³ “Telecommunications Relay Service (TRS),” FCC, October 25, 2016, accessed July 20, 2017, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>.

³⁴ “Choosing a Phone,” CapTel, accessed July 20, 2017, http://www.captel.com/captel/phones_and_Braille_CapTel_Service,” CapTel, accessed July 27, 2017, <http://www.captel.com/braille/>.

³⁵ “Apps for People with Hearing Loss,” CapTel, January 23, 2014, accessed July 20, 2017, <http://www.captel.com/news/speech-to-text-and-captioning/apps-people-hearing-loss/>.

allows individuals to receive captions for calls using the internet rather than a telephone.³⁶ Technological improvements such as these help explain why the majority of TRS call minutes are CTS and IP CTS minutes and why IP CTS is still the fastest growing type of TRS call.³⁷ These improvements have made CTS, and especially IP CTS, a more viable option for many members of the deaf and hard-of-hearing communities, likely contributing to the increase in demand observed over the same period and consistent with the underlying purpose of the ADA.

C. TRS RATE TRENDS

The reimbursement rates for VRS have consistently been the highest rates among all TRS rates. Captioned telephone services, including IP CTS, have typically had the second lowest rates of all TRS rates. Between the 2007-2008 rate-year and 2016-2017 rate-year, CTS and IP CTS nominal rates did not change significantly, increasing by an average annual rate of only 1.8%.³⁸ This rate change does not greatly differ from the other relay services, with the exception of VRS, which has been steadily decreasing.³⁹

The primary costs incurred by TRS providers are the wages paid to their CAs. Wages, as measured by the ECI, tend to follow an inflationary trend. When appropriately controlling for this inflation, real reimbursement rates remain relatively flat for most TRS modes and trend downward for the remaining modes, as depicted in Figure 10. Importantly, real reimbursement rates for IP CTS and VRS, which were projected to comprise roughly 97% of federally compensated minutes,⁴⁰ do not increase. *Therefore, any real increase in the TRS Fund cannot be a result of the compensation rates.*

³⁶ “Telecommunications Relay Service (TRS),” FCC, October 25, 2016, accessed July 20, 2017, <https://www.fcc.gov/consumers/guides/telecommunications-relay-service-trs>.

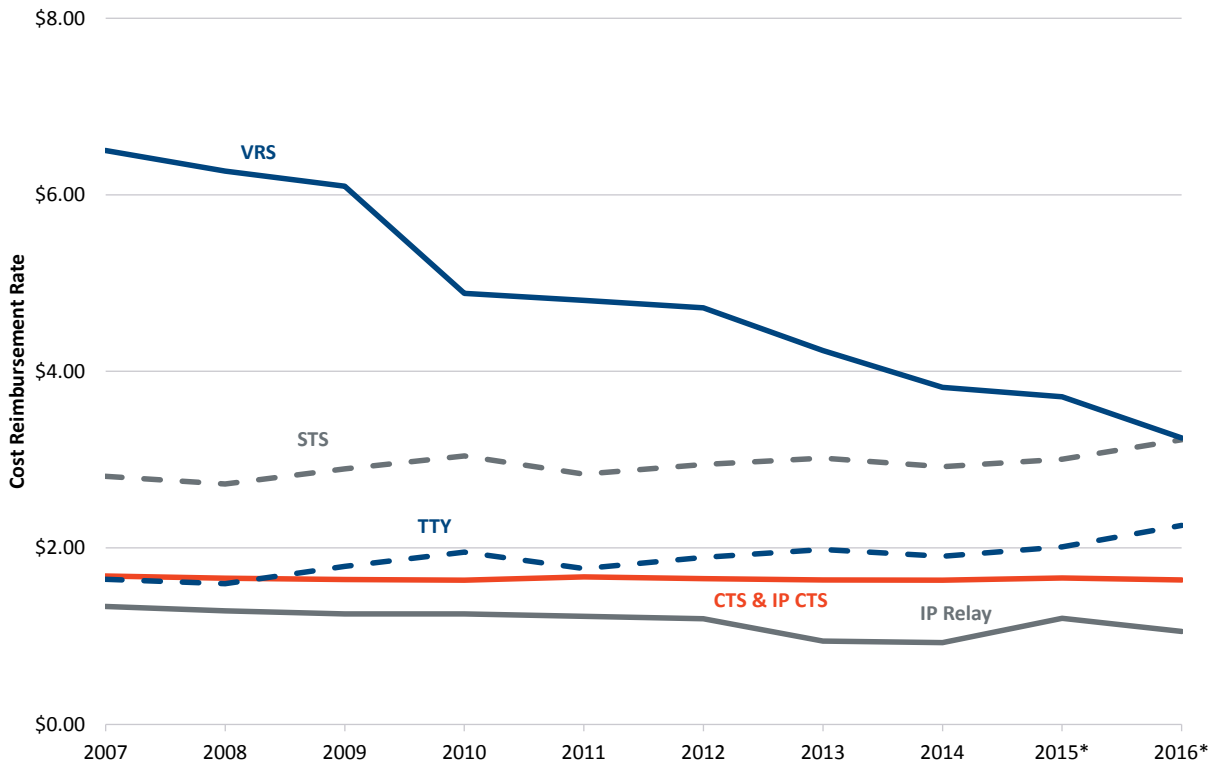
³⁷ See Figure 6 and Figure 7.

³⁸ 2015 GAO Report, p. 54.

³⁹ 2015 GAO Report, p. 54.

⁴⁰ For TRS categories for which data is incomplete in these years, projections as reported in monthly Rolka Loube Interstate TRS Fund Performance Status Reports are used. Rolka Loube Annual Report, 2016.

Figure 10: Real (ECI-Adjusted) TRS Reimbursement Rates, 2007-2016



Notes: Years indicate rate-year starts. Consistent sourcing for historical reimbursement rates for rate-years beginning 2007-2016 is not publicly available. Reimbursement rates for the rate-years beginning 2007-2014 are reported by the GAO. Reimbursement rates for the rate-years beginning 2015-2016 are projected rates from the 2015-2017 Rolka Loube Interstate TRS Fund Reports, supplemented with actual May and June rates from the 2016 and 2017 Rolka Loube Interstate TRS Fund Reports. The STS projection is the sum of STS and STS Outreach to be consistent with the 2015 GAO Report methodology. The VRS projection is a weighted average of rates by tier, weighted by projected demand in minutes.

Sources: 2015 GAO Report, p. 54; Rolka Loube Interstate TRS Fund Reports, 2015-2017; and U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>.

D. IS THE EXPANDING TRS FUND THE RESULT OF RATE INCREASES, OVER-PROVISION OF SERVICE, OR RESPONSE TO A GREATER NEED?

Observing the Fund without context, it may seem that funding has ballooned in recent years. An in-depth examination of that growth, however, reveals a nuanced picture of its causes. Without controlling for inflation, and examining only the TRS services funded by the federal TRS Fund, the Fund seems to have grown at an average annual rate of 5.2%. However, about 2% of this growth rate is attributable to inflation, and another 2% is attributable to the fact that a significant portion of intrastate relay traffic is classified as interstate for funding purposes. Therefore, in reality, the fund has only achieved modest growth, related to an increase in

services provided, of 1.1% per year after controlling for inflation and the shift from state funding to federal funding.⁴¹

In short, the modest real increase of 1.1% per year observed in the TRS Fund appears to be entirely demand driven. The question then becomes whether these demand effects represent some sort of over-provision of service or a better adherence to the ADA mandate.⁴² If the former, there are methods that can be utilized to stem unwarranted demand. If the latter, the increase should be viewed as further success of the program, evident by a greater utilization by those who benefit from the service. Because increased demand for TRS is consistent with observed demographic and technological changes, it is likely that the modest increase in the TRS Fund represents the serving of a greater need, or at least the better serving of a previously underserved need.

III. Rate Methodology

Several considerations are important in a rate methodology. The obvious consideration stems from the fact that TRS is funded by telecommunications consumers other than those who

⁴¹ Federal TRS Fund data from 2015 GAO Report, Data Table for Figure 2, p. 52; NECA Interstate TRS Fund Reports, 2009-2011; Deaf and Disabled Telecommunications Program of California, “2008-2011 Consolidated Annual Report,” California Public Utilities Commission, 2012, p. 20, accessed June 15, 2017, http://ddtp.cpuc.ca.gov/uploadedFiles/New_Navigation_Structure/About_Us/ddtp_annual_2011_v10.pdf; Michigan Relay Center, “Advisory Board Annual Report 2008,” Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2008_273726_7.pdf; Michigan Relay Center, “Advisory Board Annual Report 2009,” Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2009_317011_7.pdf; Rolka Loube Interstate TRS Fund Reports, 2012-2017; U.S. Bureau of Labor Statistics, “Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG],” Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>; “State Population Totals Tables: 2010-2016,” U.S. Census Bureau, January 18, 2017, accessed June 15, 2017, <https://www.census.gov/data/tables/2016/demo/popest/state-total.html>; and “Intercensal Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2010,” U.S. Census Bureau, November 30, 2016, accessed June 15, 2017, <https://www2.census.gov/programs-surveys/popest/tables/>.

⁴² “Title IV of the Americans with Disabilities Act (Section 255),” FCC, accessed July 26, 2017, <https://www.fcc.gov/general/title-iv-ada>.

directly benefit from the service, and it is the Commission's fiduciary duty to those consumers to use their funds judiciously. Hence, a rate methodology should not set excessive rates that lead to excessive provider profits. Likewise, a rate methodology should not produce rates so low that they force providers out and collapse the market, lest the intended service not be provided.⁴³ In addition to producing rates that are neither too high nor too low, it is important for a rate methodology to deliver the appropriate incentives to TRS providers. That is, providers should be incentivized to reduce costs, maintain/increase service quality, and engage in an efficient level of R&D spending.

To incentivize the reduction of costs, it is necessary to avoid inappropriate links between costs and reimbursement rates. While this may initially seem counterintuitive, the logic behind it is based on the simple fact that providers care about costs and reimbursement rates only insofar as they affect profits⁴⁴ and sustainability. Profits increase when the gap between costs and reimbursement rates increases. If a provider's revenue is linked to costs, then they have less of an incentive to reduce costs, as doing so would also reduce revenue.⁴⁵ In contrast, if revenue is independent of costs, then reducing costs will increase profits, providing a strong incentive to reduce costs. Reduced provider costs will allow for lower reimbursement rates in the future

⁴³ This was the case in 2013 for the IP Relay market. After an ill-conceived rate mechanism suddenly caused rates to decrease to a point at which no provider was willing to operate, the IP Relay market virtually collapsed. Emergency measures were taken and large concessions were made by the Commission in order to entice providers to stay in the market. Only one provider survived the episode. For relevant discussions, see, *e.g.*, Sorenson Communications, Inc. and CaptionCall, LLC Reply Comments on Rolka Loube Associates LLC Payment Formulas and Funding Requirements, *In the Matter of Misuse of Internet Protocol (IP) Captioned Telephone Service, Structure and Practices of the Video Relay Service Program, and Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket Nos. 13-24, 10-51, and 03-123, FCC, June 11, 2015, p. 12, accessed July 20, 2017, <https://ecfsapi.fcc.gov/file/60001077812.pdf> and Reply Comments of Hamilton Relay, Inc., *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities, Structure and Practice of the Video Relay Service Program, and Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate for the July 2015 Through June 2016 Fund Year*, CG Docket Nos. 03-123 and 10-51, June 11, 2015, p. 6, accessed July 20, 2017, <https://ecfsapi.fcc.gov/file/60001078170.pdf>.

⁴⁴ In the case where a provider is also a carrier and Fund contributor, profits will be affected by reimbursement rates as well as contribution factors.

⁴⁵ This is the classic problem with cost-plus pricing—an incentive to grow costs as large as possible.

(relative to what they would otherwise be) without driving providers out of the market, thereby relieving pressure on the TRS Fund.

To incentivize sufficient service quality, it is necessary to set a rate that allows multiple service providers to remain in the market and also allows users to choose freely between those providers. This will cause providers to compete with one another for users. In an unregulated market, providers would compete with one another in terms of consumer-price and/or quality, depending on the degree to which a product is commoditized. When consumer-price is fixed, as it is in the TRS market where the TRS Fund pays for service rather than having customers pay for service, price cannot be used as a tool to attract users. In this case competition will naturally shift to quality. Providers will attract users away from competitors by offering higher quality service. Increasing quality will go towards better achieving the ADA's mandate of functional equivalence.⁴⁶

R&D spending is important because it drives innovation. Expenditures on industry R&D can lead to reduced future costs, which in turn can lead to lower reimbursement rates and necessitate less TRS funding. For example, technology that assists CAs with text-based translation processes could reduce the training required for CAs, thereby reducing labor expenses. Likewise, such technology could reduce the need for CAs in general, further reducing labor costs. An efficient level of R&D expenditure is one that balances current costs with the resulting future costs savings and other benefits. A rate methodology that helps firms achieve this is one that allows firms to realize the future benefits of their current R&D spending.

The optimal rate methodology is one designed to mimic the forces of a free and competitive market without any market failures. This is because, in a well-working market, suppliers of a product or service are incentivized to offer a low enough price to attract customers away from competitors, but high enough to cover their costs and stay in business. Moreover, suppliers are forced to consider dynamic issues, such as how to optimally balance current R&D expenditures with the resulting future cost reductions. In conformance with the ADA's mandate, TRS users do not pay for TRS service—at least not any portion of the service above and beyond basic telephone access. Therefore, given that there is a mandated rate, the best rate methodology is one that approximates the outcomes of a free and competitive market.

⁴⁶ 2015 GAO Report, pp. 4-5.

A. ANALYSIS OF THE USE OF MARS FOR IP CTS

Currently, reimbursement rates for IP CTS, CTS, TTY, and STS use the MARS methodology to determine reimbursement rates. MARS takes a weighted average of state-specific TRS rates for states that employ a competitive bid system to establish their rates.⁴⁷ This method is advantageous because it is based on the same market forces (at the state level) that drive rates down during a competitive bidding process.⁴⁸ It also avoids some of the pitfalls that may arise if a direct bidding system were implemented at the federal level.⁴⁹

The MARS methodology applied to CTS produces a reasonable rate because it is based on the competition of providers for state contracts. There is no reason to believe that the cost of providing service under state contracts is materially different than under the federal program. The desire to win state contracts puts pressure on service providers to make bids that are in line with their marginal costs. Likewise, the MARS methodology would not produce rates that are too low, since it is unlikely that service providers would make bids for state contracts that would

⁴⁷ Report and Order and Declaratory Ruling, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket No. 03-123, FCC, November 19, 2007, ¶ 16, accessed July 28, 2017, https://apps.fcc.gov/edocs_public/attachmatch/FCC-07-186A1.pdf.

⁴⁸ As a matter of procedure, the MARS methodology only includes states that employ a competitive bid system. Moreover, state competitive bid systems award TRS provision contracts based, in large part, on cost. Providers are incentivized to enter low bids in order to win the business. Ultimately, all else equal, the provider with the lowest marginal cost will win the contract with a bid somewhere between its own marginal cost and the marginal cost of the second-lowest-cost provider. This is because the second-lowest-cost provider is willing to bid as low as its marginal cost. The lowest-cost provider, roughly understanding the position of its competitors, will make a bid slightly lower than the bid it expects from the second-lowest-cost provider. For discussion on state-level bid selection criteria, see, e.g., Pennsylvania's recent "Request for Proposals for Telecommunications Relay Service (TRS)," Pennsylvania Public Utility Commission, June 19, 2014, pp. 16–19, accessed July 21, 2017, http://www.puc.pa.gov/general/pdf/RFP/RFP-TRS_2014-2.pdf and "Request for Proposals to Provide Relay Access Services," Public Utility Commission of Texas, October 10, 2016, p. 10, accessed July 21, 2017, https://www.puc.texas.gov/agency/resources/reports/fiscal/contracts/473-17-00001_Sprint_Texas_Relay_Solicitation.pdf.

⁴⁹ A system in which service providers made some bid for the exclusive right to provide some portion of interstate minutes has some shortcomings. For example, a bidding system would need to award contracts to the prevailing providers for some preordained portion of the market. Consequently, providers would not need to increase/maintain quality in order to entice users away from each other; hence service quality would likely suffer.

result in negative profits. Moreover, the MARS methodology properly aligns incentives. Given that providers will be paid the MARS rate irrespective of their costs, they are motivated to reduce costs, as those reductions will be reflected in their bottom lines. Moreover, the MARS methodology allows for multiple providers to remain in the market in such a way that consumers can freely switch between providers. This will cause providers to maintain or improve service quality in compliance with the ADA's mandate for functional equivalence. Finally, the MARS methodology encourages an indirect but efficient level of R&D expenditure; providers will be incentivized to invest in R&D only up to the point in which future benefits cease to exceed current costs.⁵⁰

There may be a concern that the competitive benefits of the MARS methodology in the context of CTS are thwarted because the two primary state-level providers—Hamilton and Sprint—use the same subcontractor, CapTel, to provide captioning technology. This concern stems from the idea that having a single entity provide captioning technology may give them monopoly power to charge inflated prices. This sentiment is not consistent with the economics of the situation. As a preliminary matter, the two primary state-level providers do compete with one another for contracts, and the cost of captioning technology is not the only issue considered by providers when constructing a bid. This competition in state-level bids drives prices down. Furthermore, the bulk of costs are for CAs, leaving limited scope for CapTel to exercise market power. The question is whether or not having a single entity provide captioning technology to both firms creates some sort of artificial backstop below which Hamilton and Sprint will not bid. The answer is likely no. There are other TRS providers at the federal level who do not use CapTel's captioning technology but could, in principal, enter the state-level market if an opportunity to outbid Hamilton and Sprint existed. That is, if CapTel exercised monopoly power and charged an inflated price to Hamilton and Sprint, then Hamilton and Sprint would have to make high bids for state contracts. If they made excessively high bids, another federal level provider who does not rely on CapTel could step in and take state contracts away from the two and consequently cost CapTel business. This threat of market entry deters CapTel from exercising monopoly power.

⁵⁰ Alternatively, a method where providers were simply reimbursed for R&D costs would encourage expenditures beyond the efficient level. In contrast, a method by which providers were paid on a cost-reimbursement method, but R&D costs are not considered reimbursable costs, would incentivize a level of expenditures below the efficient level.

Some parties have expressed discontent with the use of the MARS methodology specifically for IP CTS, because IP CTS MARS rates are based on state CTS rates instead of IP CTS.⁵¹ The untested logic behind this discontent is the idea that the costs involved with IP CTS may be different than those involved with CTS, so an IP CTS rate based on CTS may reflect incorrect costs; *i.e.*, if IP CTS providers were to compete for state contracts, their bids would be different from their bids on CTS contracts because the marginal costs may be different.

As a preliminary matter, the premise behind this logic is not well founded. The difference between IP CTS and CTS is merely the mode by which calls travel from the user to the relay center; IP CTS uses Voice over Internet Protocol (VoIP) and CTS uses the public switched telephone network (PSTN). While VoIP may be more or less costly than PSTN depending on the circumstances, telecommunications costs are not the primary marginal cost incurred by providers—labor costs are. As discussed previously, relay services are labor intensive insofar as every call requires a human CA, and those CAs can command high wages. Moreover, IP CTS and CTS services incur the same labor costs, as they use the same pool of CAs.

However, even if the costs of CTS and IP CTS do differ in level, it is likely that they do not differ greatly in trend. That is, it is likely that IP CTS costs parallel those of CTS, and therefore, IP CTS rates based on state CTS rates will continue to properly align incentives for IP CTS providers. For example, if IP CTS costs are slightly lower than CTS costs, then the result of the two having the same rate would be slightly higher marginal earnings for IP CTS. If, in fact, IP CTS providers realize positive earnings, it does not dampen the providers' motivation to reduce costs and earn even more. Nor does it reduce providers' motivation to lure users away from competitors

⁵¹ See, *e.g.*, Sorenson Communications, Inc. and CaptionCall, LLC Reply Comments on Rolka Loube Associates LLC Payment Formulas and Funding Requirements, *In the Matter of Misuse of Internet Protocol (IP) Captioned Telephone Service, Structure and Practices of the Video Relay Service Program, and Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket Nos. 13-24, 10-51, and 03-123, FCC, June 11, 2015, pp. 1-2, accessed July 20, 2017, <https://ecfsapi.fcc.gov/file/60001077812.pdf>. For a general discussion, see, *e.g.*, Report and Order and Further Notice of Proposed Rulemaking, *In the Matter of Misuse of Internet Protocol (IP) Captioned Telephone Service and Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket Nos. 13-24 and 03-123, FCC, August 26, 2013, pp. 57-58, accessed July 20, 2017, http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0826/FCC-13-118A1.pdf.

through higher quality service. Likewise, providers' incentive to engage in the efficient level of R&D remains intact.

If IP CTS costs do differ from those of CTS, the risk involved with applying a CTS-based MARS rate to IP CTS lies not in the incentives prescribed by MARS, but in the small potential to set rates either too high or too low. However, this risk is limited to the cost difference between VoIP and PSTN. Therefore, while using CTS-based MARS for IP CTS is not perfect, the issues surrounding it may be relatively benign. Moreover, as discussed below, alternative rate methodologies that have been proposed are less economically sound than MARS and would likely generate greater inefficiencies than they resolve.

B. ANALYSIS OF POTENTIAL ALTERNATIVES TO MARS

In its most recent recommendation, Rolka Loube considered eight rate methodologies for IP CTS.⁵² Those alternatives, in the order considered by Rolka Loube, are:

1. Retaining the current MARS rate-making procedure;
2. Setting the 2017-2018 tariff year rate at the industry average cost for 2016;
3. Setting the 2017-2018 tariff year rate at the cost of a marginal provider;
4. Establishing a four-year glide path where the rates decline from the current rate to the industry average cost for 2016;
5. Establishing a four-year glide path with two tiers. Tier one rates decline from the current rate to the industry average cost for 2016 over four years. A tier two rate would be based on the industry actual average variable cost for the previous year;
6. Establishing a four-year glide path where the rates decline from the current rate to industry average cost for 2019;
7. Set the rate for each provider individually based on the provider's cost of service; and
8. Make no change pending further comment and analysis by the Commission.

Option 1, retaining the MARS rate method, while not perfect, is the most economically sound option of those considered by the Fund administrator. This is because it is the only option that is based on market forces and does not perversely skew incentives. We have discussed the virtues

⁵² Rolka Loube Associates, LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, April 28, 2017, p. 19, accessed July 20, 2017, [https://ecfsapi.fcc.gov/file/10502844703091/2017 TRS Fund Annual Report Redacted.pdf](https://ecfsapi.fcc.gov/file/10502844703091/2017%20TRS%20Fund%20Annual%20Report%20Redacted.pdf).

and shortcomings of MARS in the previous sections. In this section, we will focus on the characteristics of the MARS-alternatives considered by the Fund administrator.

We discuss Options 2 through 7 together because they share the same flaw—they all directly link rates to costs. As previously discussed, linking rates to costs diminishes providers' incentives to reduce costs. To illustrate this point, consider, for example, Option 2 where the rate is set equal to the industry average cost for the preceding year. For simplicity, assume that only three providers offer IP CTS: "P₁," a high cost provider, "P₂," a medium cost provider, and "P₃," a low cost provider. The average cost (and compensation rate) would be equal to costs summed over the three providers, divided by three. Consider a scenario where provider P₂ is contemplating the implementation of a cost-cutting innovation. If P₂ implements the innovation, its costs would be reduced by some amount, "X," and average costs (averaged across the three providers) would decrease by X/3; hence, lowering P₂'s costs by X would effectively reduce its revenue by X/3. If this innovation were free to implement, then P₂ may decide to implement it. However, if there is some expense associated with implementation (say, non-reimbursable overhead expenses), and that expense exceeds the net savings of 2X/3,⁵³ P₂ would decide not to implement the innovation.

This is a simplistic short-run view of the implications of such a rate methodology. The scenario worsens quickly as long-run factors are considered. Since the rate is set at the average cost of the three providers, that rate is necessarily lower than the costs incurred by P₁, the high cost provider. Despite Rolka Loubé's assertions to the contrary,⁵⁴ it is not reasonable to believe that P₁

⁵³ $2X/3 = X - X/3$, which is the cost savings of X, less the reduced revenue of X/3.

⁵⁴ Rolka Loubé asserts that if a rate is set below the costs incurred by a provider, then that provider can simply lower its costs. This sentiment fails tests of basic economic logic by assuming the provider is not currently acting rationally. Rolka Loubé's assertion implies there is some level of profit earned by a provider that is sufficient in the sense that providers are not interested in earning more. There is no such bound; for-profit enterprises continue to seek higher profits irrespective of their current level of profit. It stands to reason that if a provider could decrease costs, it would have already done so. Since sufficient motivation for providers to lower costs already exists, lowering rates below costs will not create some newfound motivation other than the motivation to exit the market. For an example of Rolka Loubé's assertion, see, Rolka Loubé Associates, LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities, and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, April 28, 2017, p. 21, accessed July 20, 2017, https://ecfsapi.fcc.gov/file/10502844703091/2017_TRS_Fund_Annual_Report_Redacted.pdf.

could arbitrarily lower its costs if given enough incentive. Providers already have intense incentives to lower their costs under the current rate structure because doing so directly increases their profits by an amount equal to the cost reduction.⁵⁵ Hence, it is reasonable to believe that costs have already been minimized, notwithstanding the sporadic development of cost-cutting innovations. Because rates do not compensate P_1 for the costs it incurs, and P_1 cannot reduce its costs, it will exit the market. This leaves only two providers, P_3 and P_2 , where the rate is now the average cost of the two. However, now the rate is necessarily lower than P_2 's costs. P_2 is in the same position as was P_1 and must exit the market. Through this process the market will devolve into one with only a single provider, where the rate is exactly equal to the costs incurred by that provider. In this case, P_3 , the single remaining provider, will have no incentive at all to decrease costs, as doing so would be exactly offset by an equal decrease in revenue, leaving profits unaffected.⁵⁶ Moreover, reducing the market down to a single provider will create a host of new problems related to the lack of competition.⁵⁷

Setting rates equal to the costs incurred by the marginal provider, as prescribed by Option 3, would suffer the same long-run fate as average provider cost methods. If marginal providers are earning revenue exactly equal to their costs, then they are, by definition, unprofitable. Moreover, if they incur costs that are not reimbursable, they will be earning negative profit. A systematically unprofitable provider will exit the market. The title of "marginal provider" will succeed to the next highest cost provider, and rates will be reduced to match their costs. Of course, this would render that provider unprofitable, forcing it out of the market. The cycle would continue and the market would, again, be reduced to a single provider, as was the case in the IP Relay market.⁵⁸

⁵⁵ Profit is equal to revenue (reimbursement rate) less costs. Under the current rate structure, the reimbursement rate is unaffected by changes in costs; therefore, a decrease in cost increases profit.

⁵⁶ The average cost, and therefore the reimbursement rate, would be exactly equal to the costs incurred by P_3 .

⁵⁷ For example, if only one provider exists in the market, that provider will not have proper incentive to maintain a high quality service. This is because users will have no viable alternative, making it unlikely that they will be sufficiently deterred from the use of low quality service. Moreover, the single provider will serve the entirety of the market; hence, there are no users that can be enticed to switch providers through high quality offerings.

⁵⁸ After an ill-conceived rate mechanism suddenly caused rates to decrease to a point at which no provider was willing to operate, the IP Relay market virtually collapsed. Emergency measures were taken and large concessions were made by the Commission in order to entice providers to stay in the

Setting different rates for each provider equal to that provider's costs, as prescribed by Option 7, creates the same problems that exist in a single-provider market, only with multiple providers. That is, any given provider has no incentive to decrease costs, as that decrease will be exactly offset by a decrease in revenue and therefore will have no effect on profit. Moreover, if revenue is truly set equal to costs for every provider, no provider will earn a profit. A fundamental tenet of economics is that if a business cannot earn profits it will exit the market so that its resources can be profitably put to use elsewhere. That is to say, if all providers earn less revenue than they incur in costs, they will likely all exit the market.

The problems that stem from associating rates with costs do not dissipate when adding multiple rate tiers, nor do they dissipate when implemented along some sort of glide path. Moreover, constructing tiers such that providers with variable costs equal to or exceeding the average do not earn profits on their services once the supply of those services exceeds some threshold—as is the case with Option 5⁵⁹—is particularly ill-conceived. Such a system would create perverse

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market. Only one provider survived the episode. For relevant discussions, see, *e.g.*, Sorenson Communications, Inc. and CaptionCall, LLC Reply Comments on Rolka Loube Associates LLC Payment Formulas and Funding Requirements, *In the Matter of Misuse of Internet Protocol (IP) Captioned Telephone Service, Structure and Practices of the Video Relay Service Program, and Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, CG Docket Nos. 13-24, 10-51, and 03-123, FCC, June 11, 2015, p. 12, accessed July 20, 2017, <https://ecfsapi.fcc.gov/file/60001077812.pdf> and Reply Comments of Hamilton Relay, Inc., *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities, Structure and Practice of the Video Relay Service Program, and Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate for the July 2015 Through June 2016 Fund Year*, CG Docket Nos. 03-123 and 10-51, June 11, 2015, p. 6, accessed July 20, 2017, <https://ecfsapi.fcc.gov/file/60001078170.pdf>.

⁵⁹ Option 5 suggests that after providers exceed the number of minutes that fall under the first tier, all additional minutes will be compensated according to the second tier. The second tier compensation rate is equal to the average variable cost of providing those additional minutes in the previous year. Therefore, any provider that incurs costs equal to the average variable cost will necessarily be earning zero profit on any minutes that fall into the second tier. Worse yet, any providers who incur a cost even slightly above the average variable cost will suffer a loss on any minutes that fall into the second tier. See Rolka Loube Associates, LLC, *Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate*, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, April 28, 2017, p. 22, accessed

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incentives with regard to service quality. Once these providers exceed the threshold above which they cease to earn marginal profits, they will be, at best, indifferent as to whether or not they can attract and retain users. There is then no incentive to use service quality as a tool to attract users away from competing providers; consequently, quality will decline.

Option 8, leaving the rate unchanged, is arbitrary and does not achieve any specific goal. Choosing to make no change is as arbitrary as choosing a value at random by which to change the rate; there is no evidence to suggest that a rate change of zero produces a more economically efficient rate than that implied by the MARS methodology. In fact, the contrary is true; the rate change implied by MARS is at least a response to market forces, whereas an arbitrary rate freeze would simply be a reaction to an unsubstantiated notion that rates are too high. Furthermore, if the current arbitrary rate becomes uneconomic and drives providers from the market, it will create harm.

IV. Contribution Factors

The contribution factor is the quotient of total estimated Fund size and total contribution base (the applicable interstate and international revenues generated by contributing carriers in the previous year).⁶⁰ The growth of the interstate contribution factor is driven by both an increase in the interstate Fund size and a decrease in the interstate contribution base. However, the increased interstate Fund size is largely driven by a shift from intrastate funds, which in turn decreases carriers' intrastate contribution obligations. After adjusting for the jurisdictional shift, the Fund had an average annual growth rate of 1.1% in real terms between the 2008-2009 and 2015-2016 rate-years. The average annual growth rate of the Fund base over the same period was

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July 20, 2017, [https://ecfsapi.fcc.gov/file/10502844703091/2017 TRS Fund Annual Report Redacted.pdf](https://ecfsapi.fcc.gov/file/10502844703091/2017_TRS_Fund_Annual_Report_Redacted.pdf).

⁶⁰ Interstate revenues and contribution base are used as shorthand for the applicable interstate and international revenues generated by contributing FCC Form 499-A filers. Rolka Loube Associates LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket No. 03-123 and CG Docket No. 10-51, FCC, April 28, 2017, p. 5, accessed July 20, 2017, [https://ecfsapi.fcc.gov/file/10502844703091/2017 TRS Fund Annual Report Redacted.pdf](https://ecfsapi.fcc.gov/file/10502844703091/2017_TRS_Fund_Annual_Report_Redacted.pdf).

-4.8%, suggesting that the increasing contribution factor is largely driven by changes in the contribution base rather than changes in TRS funding obligations. While limiting the Fund size would, of course, limit fund growth, it would likely not in itself stem the growth of contribution factors.

The effects of Fund size on contribution factors notwithstanding, the principle driver of growing contribution factors appears to be a shrinking contribution base rather than Fund size. Moreover, the modest real growth in funding obligations is consistent with reasonable increases in demand, which could be viewed as a success of the program rather than a cause for concern.

TRS services are paid out of the Fund, which is financed via contributions made by interstate telecommunications providers.⁶¹ The contribution factor, which determines the portion of revenue contributors must contribute to the Fund, is calculated as the predicted Fund net cash requirement divided by the contribution base.⁶² The contribution factor will therefore increase if there is either an increased cash requirement or a decreased contribution base. All interstate carriers pay into the Fund based on the size of their interstate and international end-user revenues, as reported on the FCC's Form 499-A.⁶³

⁶¹ 2015 GAO Report, p. 1 at footnote 3.

⁶² See, e.g., Order, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, FCC, June 30, 2015, pp. 1 and 5, accessed July 26, 2017, http://transition.fcc.gov/Daily_Releases/Daily_Business/2015/db0701/DA-15-774A1.pdf.

⁶³ Rolka Loube Associates LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, FCC, April 28, 2017, p. 8 at footnote 13, accessed July 20, 2017, https://ecfsapi.fcc.gov/file/10502844703091/2017_TRS_Fund_Annual_Report_Redacted.pdf and 2016 Telecommunications Reporting Worksheet Instructions (FCC Form 499-A), FCC, January 2016, pp. 2-3, accessed July 26, 2017, <https://usac.org/res/documents/cont/pdf/forms/2016/2016-FCC-Form-499A-Form-Instructions.pdf>.

A. TRENDS IN CONTRIBUTION BASE

The Fund contribution base has declined nearly every year of the past decade.⁶⁴ Much of this trend can be attributed to technological and jurisdictional changes that affect both TRS directly—including changes in the types of TRS preferred by consumers—and the telecommunications industry broadly, such as the increasingly popularity of VoIP technologies.

Between the rate-years 2005-2006 and 2015-2016, the contribution base decreased by an average nominal rate of 2.3% per year, equivalent to a reduction of over \$16 billion.⁶⁵ Over the same period of time, the total reported revenue of Form 499-A filers grew at an average annual nominal rate of 3.0%.⁶⁶ If the nominal contribution base had grown at a similar rate, it would have been over \$108.1 billion in the 2015-2016 rate-year rather than its actual size of \$64.1 billion.⁶⁷ With the TRS Fund requirements for the 2015-2016 rate-year of \$1.05 billion, the

⁶⁴ Rolka Loube Associates LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, FCC, April 28, 2017, p. 9 at Table 1, accessed July 20, 2017, https://ecfsapi.fcc.gov/file/10502844703091/2017_TRS_Fund_Annual_Report_Redacted.pdf.

⁶⁵ Rolka Loube Associates LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, FCC, April 28, 2017, p. 9 at Table 1, accessed July 20, 2017, https://ecfsapi.fcc.gov/file/10502844703091/2017_TRS_Fund_Annual_Report_Redacted.pdf.

⁶⁶ “Universal Service Monitoring Report, 2016,” FCC, December 2016, Table 1.1, accessed July 20, 2017, https://apps.fcc.gov/edocs_public/attachmatch/DOC-343025A1.pdf.

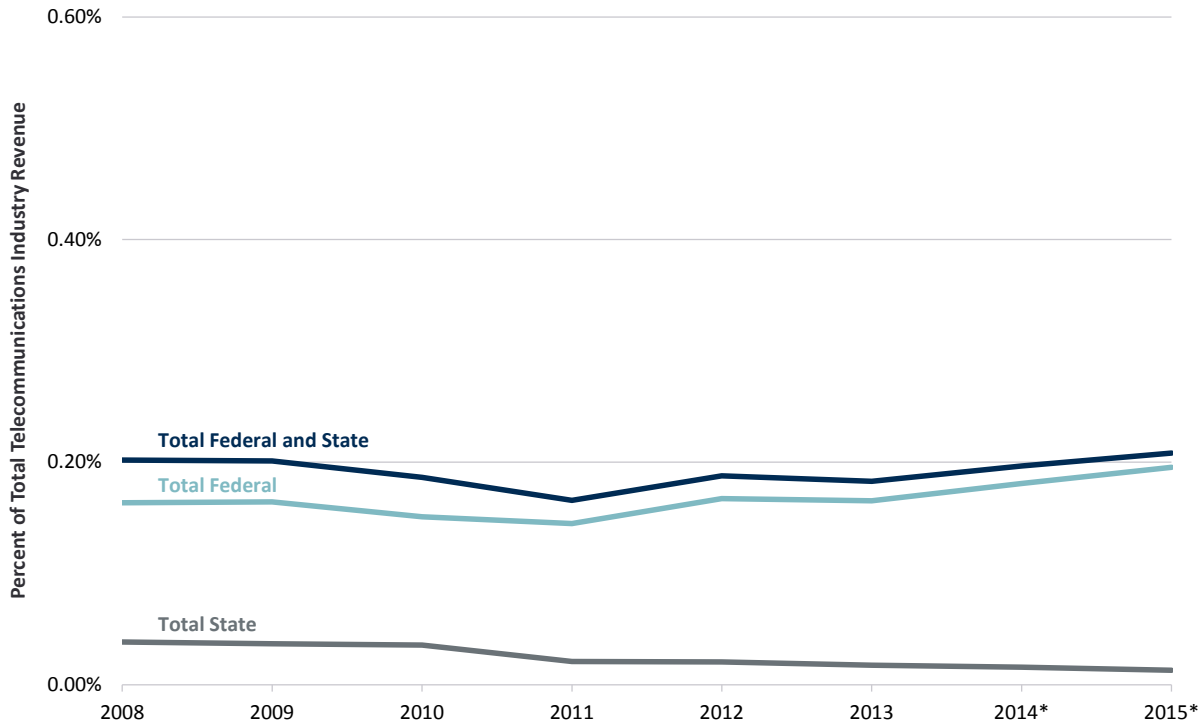
⁶⁷ Calculation: \$108.1 billion = \$80.7 billion 2005 contribution base x (1 + 3.0%)¹⁰. “Universal Service Monitoring Report, 2016,” FCC, December 2016, Table 1.1, accessed July 20, 2017, https://apps.fcc.gov/edocs_public/attachmatch/DOC-343025A1.pdf and Rolka Loube Associates LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, FCC, April 28, 2017, Table 1 at p. 9, accessed July 20, 2017, https://ecfsapi.fcc.gov/file/10502844703091/2017_TRS_Fund_Annual_Report_Redacted.pdf.

contribution factor would have only been 0.00969 rather than the actual contribution factor of 0.01635 in that rate-year.⁶⁸

It is illustrative to step back from the contribution base and directly compare TRS trends to trends in the broader telecommunications market. Figure 11 depicts TRS funding as a percent of total telecommunications industry revenue. It is straightforward to see that total funding (state and federal level) has not substantially increased relative to the broader industry growth.

⁶⁸ Calculation: $0.00969 = \$1.05 \text{ billion} / \108.1 billion . “Universal Service Monitoring Report, 2016,” FCC, December 2016, Table 1.1, accessed July 5, 2017, https://apps.fcc.gov/edocs_public/attachmatch/DOC-343025A1.pdf; Rolka Loube Associates LLC, Interstate Telecommunications Relay Services Fund Payment Formula and Fund Size Estimate, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, FCC, April 28, 2017, p. 9, accessed July 20, 2017, [https://ecfsapi.fcc.gov/file/10502844703091/2017 TRS Fund Annual Report Redacted.pdf](https://ecfsapi.fcc.gov/file/10502844703091/2017%20TRS%20Fund%20Annual%20Report%20Redacted.pdf); and Order, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, FCC, June 30, 2015, p. 2, accessed July 26, 2017, http://transition.fcc.gov/Daily_Releases/Daily_Business/2015/db0701/DA-15-774A1.pdf.

Figure 11: Real (ECI-Adjusted) TRS Funding as a Proportion of Total Telecommunications Industry Revenue as Reported in Form 499, 2008-2015



Notes: Telecommunications industry revenue measures exclude any revenues not reported on form 499. Dollar figures are given in constant 2008 dollars. Years indicate rate-year starts. Consistent sourcing for historical TRS service-specific cost data for rate-years beginning 2008-2015 is not publicly available. Historical cost data for rate-years beginning 2008-2013 are reported by the GAO. Costs for rate-years beginning in 2014-2015 are incurred costs for July-March and projections for April-June made by Rolka Loube in its Interstate TRS Fund Reports. Industry revenue data was unavailable past 2015. For TRS categories for which data is incomplete in these years, projections as reported in monthly Rolka Loube Interstate TRS Fund Performance Status Reports are used. FCC Form 499-A filers include nearly all intrastate, interstate, and international providers of telecommunications in the United States. Total Industry Revenue comes from Form 499-A Total Reported Revenue.

Sources: 2015 GAO Report, Data Table for Figure 2, p. 52; "Universal Service Monitoring Report, 2016," FCC, December 2016, Table 1.1, accessed July 5, 2017, https://apps.fcc.gov/edocs_public/attachmatch/DOC-343025A1.pdf; NECA Interstate TRS Fund Reports, 2009-2011; Deaf and Disabled Telecommunications Program of California, "2008-2011 Consolidated Annual Report," California Public Utilities Commission, 2012, p. 20, accessed June 15, 2017, http://ddtp.cpuc.ca.gov/uploadedFiles/New_Navigation_Structure/About_Us/ddtp_annual_2011_v10.pdf; Michigan Relay Center, "Advisory Board Annual Report 2008," Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2008_273726_7.pdf; Michigan Relay Center, "Advisory Board Annual Report 2009," Michigan Public Service Commission, p. 7, accessed June 15, 2017, https://www.michigan.gov/documents/mpsc/mirelayreport2009_317011_7.pdf; Rolka Loube Interstate TRS Fund Reports, 2012-2017; Rolka Loube Monthly TRS Fund Status Reports; U.S. Bureau of Labor Statistics, "Employment Cost Index: Wages and Salaries: Private Industry Workers [ECIWAG]," Federal Reserve Bank of St. Louis, accessed July 20, 2017, <https://fred.stlouisfed.org/series/ECIWAG>; "State Population Totals Tables: 2010-2016," U.S. Census Bureau, January 18, 2017, accessed June 15, 2017, <https://www.census.gov/data/tables/2016/demo/popest/state-total.html>; "Intercensal

Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2010," U.S. Census Bureau, November 30, 2016, accessed June 15, 2017, <https://www2.census.gov/programs-surveys/popest/tables/>; and 2015-2017 May and June Monthly Rolka Loube Reports.

Several general conclusions can be drawn from this analysis: 1) TRS usage has kept reasonable pace with the broader telecommunications industry, 2) TRS costs have remained a relatively stable portion of industry revenue, and 3) the contribution base has deviated substantially from industry trends. Given this information, we reasonably conclude that the driving force behind increasing contribution factors is likely the decreasing base, rather than Fund growth. This conclusion is further supported by the fact that the Fund had an average annual growth rate of only 1.1% in real terms between the 2008-2009 and 2015-2016 rate-years, while the equivalent measure of the Fund base was -4.8%, as was mentioned above.

B. FACTORS LEADING TO THE DIMINISHED CONTRIBUTION BASE

1. Changing Industry

The telecommunications industry is reporting less revenue from services currently contributing to the Fund. One example of the transition away from traditional communication methods is the switch to VoIP services, which place calls using connections made over the internet rather than traditional analog systems.⁶⁹ As of October 2007, interconnected VoIP providers were required to pay into the fund and to report revenues on the Form 499-A.⁷⁰ These services allow users to make calls through the PSTN.⁷¹ Non-interconnected VoIP services, which are not connected to the PSTN, have been required to contribute since October 2011, with the exception of non-

⁶⁹ "Voice Over Internet Protocol (VoIP)," FCC, accessed July 20, 2017, <https://www.fcc.gov/general/voice-over-internet-protocol-voip>.

⁷⁰ Report and Order, *In the Matter of Contributions to the Telecommunications Relay Services Fund*, FCC, CG Docket No. 11-47, October 7, 2011, p. 4 and p. 5 at footnote 23, accessed July 20, 2017, https://apps.fcc.gov/edocs_public/attachmatch/FCC-11-150A1.pdf.

⁷¹ "Voice Over Internet Protocol (VoIP)," FCC, accessed July 20, 2017, <https://www.fcc.gov/general/voice-over-internet-protocol-voip> and Report and Order, *In the Matter of Contributions to the Telecommunications Relay Services Fund*, FCC, CG Docket No. 11-47, October 7, 2011, p. 4 and p. 5 at footnote 23, accessed July 20, 2017, https://apps.fcc.gov/edocs_public/attachmatch/FCC-11-150A1.pdf.

interconnected VoIP service providers who offer services for free (no charge to the end user).⁷² As a result of this exception, free services provided by Skype, Google, WhatsApp, Facebook, Viber, and more do not count toward the contribution base, even though they siphon revenue from other telecommunications providers who do contribute to the Fund.⁷³ Such Over-The-Top (OTT) services have grown rapidly over the past decade and are projected to overtake carrier traffic in the worldwide international call market in the next year.⁷⁴ The reason that free OTT VoIP services escape the need to pay into the Fund is that VoIP contribution obligations are based on end-user revenue; however, since these services are free to the end-user, those end-users are not the direct source of revenue.

2. Shifts between Interstate and Intrastate Contributions

As older types of TRS have waned in popularity, so too has the need for reimbursement from state funds. Intrastate TRS calls are paid for out of state TRS Funds rather than out of the federal Fund.⁷⁵ As noted in Section II.A, IP-based TRS methods often make it difficult to determine if a call is intrastate or interstate. As a result, these services are paid for out of the federal Fund rather than state TRS Funds.⁷⁶ In recent years, internet-based methods have grown to account for the

⁷² Report and Order, *In the Matter of Contributions to the Telecommunications Relay Services Fund*, CG Docket No. 11-47, FCC, October 7, 2011, pp. 4-5 and 7-8, accessed July 20, 2017, https://apps.fcc.gov/edocs_public/attachmatch/FCC-11-150A1.pdf.

⁷³ Robert Triggs, “Which Voice Calling App Uses the Most Data per Minute? We Tested the Top 10,” Android Authority, April 3, 2015, accessed July 28, 2017, <http://www.androidauthority.com/voice-call-data-comparison-598541>; Lars Nohling, “What Does OTT or ‘Over the Top Communications’ Really Mean?,” Edgewater Networks, February 2, 2016, accessed July 20, 2017, <https://www.edgewaternetworks.com/blog/2016/02/what-does-over-the-top-communications-really-mean>; and Comments of Microsoft Corporation, *In the Matter of Universal Service Contribution Methodology and A National Broadband Plan For Our Future*, WC Docket No. 06-122 and GN Docket No. 09-51, FCC, July 9, 2012, pp. 3-6, accessed July 20, 2017, <https://ecfsapi.fcc.gov/file/7021984884.pdf>.

⁷⁴ Patrick Christian, “New Year, New TeleGeography Report,” TeleGeography, January 4, 2017, accessed July 20, 2017, <http://blog.telegeography.com/new-telegeography-report-voice-data-long-distance-2016-2017> and Stephan Beckert, “Rise of the Apps: How OTT Traffic is Balancing a Carrier Slump,” TeleGeography, February 1, 2017, accessed July 20, 2017, <http://blog.telegeography.com/rise-of-the-apps-how-ott-traffic-is-balancing-a-carrier-slump>.

⁷⁵ 2015 GAO Report, p. 8.

⁷⁶ 2015 GAO Report, p. 10.

majority of all TRS call minutes, resulting in an increased demand for federal TRS funds.⁷⁷ Indeed, more than 92% of 2016-2017 rate-year federal and state minutes utilized VRS, IP CTS, or IP Relay—all internet-based services paid for out of the federal Fund regardless of whether they are interstate or intrastate.⁷⁸ In 2008, 27% of the demand for TRS minutes fell to the states. By 2016, the states' share declined to 6%. Despite this shift in funding obligation from state to federal, no parallel shift in contribution obligations has occurred. Intrastate carriers are being relieved of their obligation to fund intrastate TRS.

V. Conclusions

- Inflation. While the interstate TRS Fund is clearly growing in nominal terms, that growth is explained largely by inflation. Once inflation is accounted for, the average annual growth rate of the Fund decreases from 5.2% to 3.2%.
- Jurisdictional Shift. Another substantial factor in the growth of the Fund is the shift in jurisdictional funding obligations from state to federal. The percentage of total minutes funded by the federal TRS Fund in 1999 was estimated to be about 21%, whereas the equivalent estimate for 2016 was 94%. After accounting for the jurisdictional shift from state funding to federal funding, TRS funding obligations only grow by about 1.1% per year since 2008.
- Rates in Real Terms. This 1.1% real growth is not the result of increasing reimbursement rates. Real (inflation-adjusted) reimbursement rates for IP CTS and VRS, which were projected to comprise roughly 97% of federally compensated minutes in the 2016-2017 rate-year, have not been trending upwards; hence, any real increase in the TRS Fund cannot be a result of the compensation rates.
- Shifting and Increasing Demand. Combined state and federal TRS usage has been increasing by 7.0% per year since 2008, which implies that the modest real growth in the Fund is likely the result of shifting and increasing demand.
- Telecommunications and Relay Usage Trends. The observed shifts in demand are consistent with the relay usage market's demographic and technological trends and likely are not the result of some sort of misuse.
- Contribution Base. Although the TRS fund is experiencing some growth, the steadily increasing contribution factors are likely driven, in large part, by a shrinking contribution base. This is punctuated by the fact that the real annual growth rate of the Fund is 1.1%, while the real annual growth rate of the contribution base is -4.8%. That is, in terms of

⁷⁷ See Figure 6, Figure 7, and 2015 GAO Report, p. 10.

⁷⁸ See Figure 6, Figure 7, and 2015 GAO Report, p. 10.

the contribution factor formula,⁷⁹ the denominator is shrinking faster than the numerator is growing. The contribution base is shrinking relative to the TRS Fund because of structural shifts within the broader telecommunications market as well as shifts in jurisdictional obligations. In short, the contribution base has not kept pace with industry-wide trends. An in-depth examination of the contribution base is warranted.

- Competitively Set Rates. Understanding the mechanism that can drive reimbursement rates down highlights the need to have a rate methodology that is based on competitive forces. To that end, rates that are directly linked to costs skew the incentives of providers. When providers are faced with decisions to reduce costs, those decisions will be greatly influenced by the portion of the costs-savings that goes towards the bottom line. When reducing costs also sufficiently reduces revenue, it is not rational to expect providers to reduce costs. This fact remains true whether rates are based on marginal or average costs and irrespective of how many rate tiers complicate the methodology. A rate methodology should simulate the outcome of a competitive market. Of the methodologies examined by the Fund administrator, the MARS methodology most closely approximates a competitive outcome. Although MARS is not perfect, it is likely the best option given the regulatory and legislative structure of the TRS market.

⁷⁹ $\left(\frac{\text{Fund Requirements}}{\text{Contribution Base}}\right)$. See, e.g., Order, *In the Matter of Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities and Structure and Practices of the Video Relay Service Program*, CG Docket Nos. 03-123 and 10-51, FCC, June 30, 2015, p. 5, accessed July 26, 2017, http://transition.fcc.gov/Daily_Releases/Daily_Business/2015/db0701/DA-15-774A1.pdf.

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