

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)	
)	
Transition from TTY to Real-Time Text Technology)	CG Docket No. 16-145
)	
Petition for Rulemaking to Update the Commission’s Rules for Access to Support the Transition from TTY to Real-Time Text Technology, and Petition for Waiver of Rules Requiring Support of TTY Technology)	GN Docket No. 15-178

REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULEMAKING

Adopted: December 15, 2016

Released: December 16, 2016

Comment Date: (30 days after date of publication in the Federal Register)

Reply Comment Date: (60 days after date of publication in the Federal Register)

By the Commission: Chairman Wheeler and Commissioners Clyburn, Rosenworcel, Pai, and O’Rielly
issuing separate statements.

TABLE OF CONTENTS

Heading	Paragraph #
I. INTRODUCTION AND BACKGROUND	1
II. EXECUTIVE SUMMARY	6
III. DISCUSSION.....	8
A. RTT is an Effective and Efficient Replacement for TTY Technology	8
B. Permitting RTT Support in Lieu of TTY Support over IP-Based Wireless Voice Services and Devices	11
1. Wireless Service Support for RTT	14
2. End User Device Support for RTT	19
C. Regulatory Relief	22
D. Performance Objectives	24
E. Minimum Functionalities of RTT	26
1. Interoperability	27
2. Backward Compatibility with TTY Technology.....	32
3. Support for 911 Communications.....	42
F. Core RTT Features.....	52
G. Timeline for RTT Implementation.....	65
1. Service Providers.....	66
2. Manufacturers.....	69
3. Other Compliance Deadlines and Related Matters.....	70
H. Education, Outreach, and Notifications	72
IV. FURTHER NOTICE OF PROPOSED RULEMAKING	75
A. Establishing a Deadline to Sunset the Obligation to Ensure RTT is Backward Compatible	

with TTY Technology.....	76
B. Requirements for TRS Providers	78
C. Other RTT Features	88
V. PROCEDURAL MATTERS.....	90
A. Regulatory Flexibility Act	90
B. Paperwork Reduction Act Analysis	92
C. Comment Filing Procedure	94
D. <i>Ex Parte</i> Presentations	98
E. Congressional Review Act.....	99
F. Accessible Formats	100
G. Further Information.....	101
H. Incorporation by Reference.....	102
VI. ORDERING CLAUSES.....	104
APPENDIX A – List of Commenting Parties	
APPENDIX B – Final Rules	
APPENDIX C – Final Regulatory Flexibility Analysis	
APPENDIX D – Initial Regulatory Flexibility Analysis	

I. INTRODUCTION AND BACKGROUND

1. In this Report and Order, the Federal Communications Commission (Commission) amends its rules to facilitate a transition from text telephone (TTY) technology to real-time text (RTT) as a reliable and interoperable universal text solution over wireless Internet protocol (IP) enabled networks for people who are deaf, hard of hearing, deaf-blind, or have a speech disability.¹ In the accompanying Further Notice of Proposed Rulemaking (FNPRM), we address application of RTT to telecommunications relay services (TRS) and seek further comment on a sunset date for TTY support, as well as other matters pertaining to the deployment of RTT. RTT, which allows text characters to be sent as they are being created, can be sent simultaneously with voice, and permits the use of off-the-shelf end user devices to make text telephone calls. By this proceeding, we take a major step toward enabling a universal and integrated text solution for people with disabilities who rely on text communications in the twenty-first century.

2. Since the 1970s, TTY technology has provided the only means for people with disabilities to send and receive text communications over the public switched telephone network (PSTN).² To ensure that TTY users have comparable telephone network access as voice users, the Commission’s rules have required providers and device manufacturers of telecommunications services and advanced communications services (ACS) to support TTY technology. These rules include:

- Commercial Mobile Radio Services (CMRS) providers must be capable of transmitting 911 calls from individuals who are deaf, hard of hearing, or have speech disabilities, through means other than mobile radio handsets, such as TTY technology.³

¹ For purposes of this proceeding, we refer to people who are deaf, hard of hearing, deaf-blind, or have a speech disability collectively as “people with disabilities” or “text-reliant users.”

² TTY technology “employs graphic communication in the transmission of coded signals through a wire or radio communication system.” 47 CFR § 64.601(a)(33). See *Transition from TTY to Real-Time Text Technology; Petition for Rulemaking to Update the Commission’s Rules for Access to Support the Transition from TTY to Real-Time Text Technology, and Petition for Waiver of Rules Requiring Support of TTY Technology*, Notice of Proposed Rulemaking, 31 FCC Rcd 6247, 6250, para. 5 (2016) (NPRM).

³ 47 CFR § 20.18(c).

- Telecommunications and interconnected voice over Internet protocol (VoIP) service providers and equipment manufacturers must support TTY connectability and TTY signal compatibility;⁴
- ACS providers and equipment manufacturers that provide voice communication functionality must support TTY connectability and compatibility;⁵ and
- Common carriers and interconnected VoIP service providers must offer their customers access to PSTN-based TRS, including access through 711 abbreviated dialing via a voice telephone or TTY.⁶

3. Changes to communications networks, particularly ongoing technology transitions from circuit switched to IP-based networks and from copper to wireless and fiber infrastructure, have affected the quality and utility of TTY technology, prompting discussions on transitioning to an alternative advanced communications technology for text communications. For example, as early as 2010, the Commission's National Broadband Plan recommended opening a proceeding to implement a standard for reliable and interoperable RTT.⁷ The following year, the Commission's Emergency Access Advisory Committee (EAAC) recommended that the Commission eventually replace the requirement to support TTY with IP-based solutions that support RTT,⁸ a recommendation that the EAAC reaffirmed in March of 2013.⁹ The Commission also has considered the need to address the text communications needs of

⁴ 47 U.S.C. § 255; 47 CFR §§ 6.5, 7.5; *see also* 47 CFR §§ 6.3(b), 7.3(b) (each defining these obligations to include TTY connectability and TTY signal compatibility).

⁵ 47 U.S.C. § 617; 47 CFR §§ 14.20, 14.21(d) (requiring TTY connectability and compatibility in the same manner as under Parts 6 and 7 of the Commission's rules).

⁶ *See* 47 U.S.C. §§ 225(c) (requiring common carriers to provide TRS either directly or through a state program), 616 (requiring, among other things, interconnected VoIP service providers to participate in and contribute to the Interstate TRS Fund); 47 CFR §§ 64.603 (requiring common carriers providing voice telephone service to provide TRS, including via the 711 dialing code), 64.604(a)(3)(v) (listing the types of calls that TRS providers must provide, which include calls made using TTYs), 64.601(b) (providing that TRS regulations applicable to common carriers shall also be applicable to interconnected VoIP service providers). The Commission adopted 711 dialing access and required common carriers and interconnected VoIP service providers to support 711 dialing so that TRS users could initiate a relay call by TTY or voice, anywhere in the United States, without having to remember and dial different 7- and 10-digit toll-free numbers when traveling from state to state. 47 CFR §§ 64.601(a)(1) (defining 711 as the abbreviated dialing code for accessing relay services); *Use of N11 Codes and Other Abbreviated Dialing Arrangements*, Second Report and Order, 15 FCC Rcd 15188, 15191-92, para. 3 (2000); *IP-Enabled Services et al.*, Report and Order, 22 FCC Rcd 11275, 11295-96, paras. 42-43 (2007) (*VoIP Accessibility and TRS Order*) (extending the obligation to offer 711 abbreviated dialing access for TRS to interconnected VoIP service providers).

⁷ FCC, *Connecting America: The National Broadband Plan* at 182 (2010), <https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf> (Recommendation 9.10).

⁸ The Twenty-First Century Communications and Video Accessibility Act of 2010 (CVAA) directed the establishment of the EAAC to develop recommendations on "the most effective and efficient technologies and methods by which to enable access to emergency services by individuals with disabilities," including a recommendation for the possible phase-out of TTY technology. Pub. L. No. 111-260, § 106(c)(6), 124 Stat. 2751, 2763 (2010) (codified at 47 U.S.C. § 615c(c)(6)); *see also* EAAC, Report and Recommendations at 28, 31 (2011), https://apps.fcc.gov/edocs_public/attachmatch/DOC-312161A1.pdf (Recommendation P6.5: Conditional TTY Waiver; Recommendation T2.2: Removal of TTY Requirement).

⁹ EAAC, Report on TTY Transition at 4-5 (Mar. 11, 2013), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-319386A1.doc (EAAC TTY Transition Report) (recommending the replacement of the TTY support requirements with requirements for direct access to 911 services via IP-based text communications that include RTT).

people with disabilities in its proceedings on technology transitions¹⁰ and Next Generation 911 (NG911) access.¹¹

4. The instant proceeding responds to a petition filed by AT&T in June 2015, requesting the Commission to update its accessibility rules to allow RTT to replace TTY technology over IP-based networks.¹² AT&T's petition urges that RTT be deemed to meet the Commission's accessibility requirements in IP-based networks, provided that implementation of this technology is both backward compatible with TTY technology and interoperable with RTT on other IP-based networks.¹³ In October 2015 and February 2016, the Commission's Disability Advisory Committee (DAC) adopted two sets of recommendations for the Commission to consider concerning RTT, the first recommending that the Commission initiate a rulemaking to explore RTT as a text replacement in an IP environment,¹⁴ and the second recommending features and capabilities that RTT technology should have.¹⁵

¹⁰ See, e.g., *Technology Transitions; USTelecom Petition for Declaratory Ruling that Incumbent Local Exchange Carriers Are Non-Dominant in the Provision of Switched Access Services; Policies and Rules Governing Retirement of Copper Loops by Incumbent Local Exchange Carriers*, Declaratory Ruling, Second Report and Order, and Order on Reconsideration, 31 FCC Rcd 8283, 8339, para. 150 (2016) (*Technology Transitions Order*) (predicting that more accessibility features and functionalities will be achievable with next-generation services, and encouraging service providers to proffer replacement services with such features and functionalities).

¹¹ See, e.g., *Facilitating the Deployment of Text-to-911 and Other Next Generation 911 Applications; Framework for Next Generation 911 Deployment*, Second Report and Order and Third Further Notice of Proposed Rulemaking, 29 FCC Rcd 9846, 9847, para. 1 (2014) (*T911 Second Report and Order and Third Further Notice*) (recognizing that providing effective text communication for emergency services will expand access for people with disabilities).

¹² Petition of AT&T Services, Inc., for Rulemaking, PS Docket No. 11-153 et al. (filed June 12, 2015), <https://ecfsapi.fcc.gov/file/60001079460.pdf> (AT&T Petition for Rulemaking). On July 24, 2015, the Consumer and Governmental Affairs Bureau (CGB), the Public Safety and Homeland Security Bureau (PSHSB), the Wireline Competition Bureau (WCB), and the Wireless Telecommunications Bureau (WTB) released a public notice seeking comment on AT&T's petition. See *Request for Comment on Petition for Rulemaking to Update the Commission's Rules for Access to Support the Transition from TTY to Real-Time Text Technology, and Petition for Waiver of Rules Requiring Support of TTY Technology*, Public Notice, 30 FCC Rcd 7438 (CGB, PSHSB, WCB, WTB 2015).

¹³ AT&T Petition for Rulemaking at 5-6. AT&T simultaneously filed a petition requesting that the Commission temporarily waive the Commission's requirements to support TTY technology for wireless devices and services on VoIP networks "during the pendency of the rulemaking and until RTT is fully deployed to allow [AT&T] to offer VoIP services that do not reliably support TTY." Petition of AT&T Services, Inc., for Waiver, PS Docket 11-153 et al. (filed June 12, 2015) <https://ecfsapi.fcc.gov/file/60001079387.pdf> (AT&T Petition for Waiver). On October 6, 2015, CGB, PSHSB, WCB, and WTB granted AT&T a temporary waiver of the requirements to support TTY technology on wireless IP-based networks, subject to certain conditions. *Petition for Waiver of Rules Requiring Support of TTY Technology*, Order, 30 FCC Rcd 10855 (CGB, PSHSB, WTB, WCB 2015) (*AT&T TTY-RTT Transition Waiver Order*). Since then, other wireless service providers have requested and received comparable temporary waivers of the requirements to support TTY technology on wireless IP-based networks. See *Petition for Waiver of Rules Requiring Support of TTY Technology*, Order, 30 FCC Rcd 12755 (CGB, PSHSB, WTB, WCB 2015) (granting waiver to Verizon); *Petition for Waiver of Rules Requiring Support of TTY Technology*, 30 FCC Rcd 14404 (CGB PSHSB WTB WCB 2015) (granting waiver to Cellular South, Inc.), *modified*, Letter Order, 31 FCC Rcd 201 (CGB PSHSB WTB WCB 2016); *Petition for Waiver of Rules Requiring Support of TTY Technology*, Order, 31 FCC Rcd 3778 (CGB PSHSB WTB WCB 2016) (granting waiver to the Competitive Carriers Association).

¹⁴ Recommendation of the FCC DAC (Oct. 8, 2015) https://apps.fcc.gov/edocs_public/attachmatch/DOC-335867A1.pdf (DAC October 2015 Recommendations). The DAC was established on December 2, 2014, to provide advice and recommendations to the Commission on a wide array of disability issues within the FCC's jurisdiction. It consists of a wide range of industry, consumer, and governmental stakeholders. See generally, FCC, Disability Advisory Committee (Nov. 10, 2016), <https://www.fcc.gov/general/disability-advisory-committee>.

¹⁵ Recommendation of the FCC DAC (Feb. 23, 2016), <http://apps.fcc.gov/ecfs/comment/view?id=60001486890> (DAC February 2016 Recommendations).

5. On April 28, 2016, we adopted a Notice of Proposed Rulemaking (*NPRM*) proposing to amend the Commission's rules to facilitate an effective and seamless transition from TTY technology to RTT over wireless IP-based networks and services.¹⁶ Recognizing the limitations of TTY technology in an IP environment and the need to transition to a more advanced text communications solution, we proposed to require wireless IP-based service providers and manufacturers of IP-based wireless end user devices to support RTT in lieu of supporting TTY technology.¹⁷ Further, we sought comment on extending RTT support requirements to wireline IP-based services and equipment.¹⁸ We asked whether there are certain minimum functionalities of RTT that must be supported to provide people with disabilities with text-based telephone service that is as accessible, usable, and otherwise as effective as voice-based services over IP-based networks.¹⁹ For example, we sought feedback on whether we should recognize a common standard for implementing RTT, and proposed adopting RFC 4103²⁰ as a safe harbor standard to ensure RTT interoperability, while permitting flexibility for service providers to adopt alternative, compatible methods of providing RTT.²¹ Next, we sought comment on whether the proposed minimum features for RTT would be enabled or facilitated by RFC 4103.²² Additionally, we sought comment on the proposed timelines and transition periods for implementing RTT and the use of a downloadable RTT application as an interim solution for implementation.²³ Finally, we sought comment on the best means of providing consumer outreach and education to inform the public, including businesses, government agencies, and individuals with disabilities, about the transition from TTY technology to RTT.²⁴ In response to the *NPRM*, 25 parties filed comments and 13 filed reply comments.²⁵

II. EXECUTIVE SUMMARY

6. To facilitate an effective and seamless transition to RTT, we take the following actions:

- Amend Part 20 of the Commission's rules to allow CMRS providers to support RTT in lieu of TTY technology for communications using wireless IP-based voice services;
- Amend Parts 6, 7, and 14 of the Commission's rules to allow providers of telecommunications and interconnected VoIP services provided over wireless IP facilities, and manufacturers of equipment used with such services to support RTT in lieu of supporting TTY technology;²⁶

¹⁶ See generally *NPRM*, 31 FCC Rcd 6247.

¹⁷ *Id.* at 6257, para. 15.

¹⁸ *Id.* at 6290, para. 95.

¹⁹ *Id.* at 6270, para. 43.

²⁰ RFC 4103 is defined as the standard Internet Engineering Task Force (IETF) Request for Comments (RFC) 4103, Real-time Transport Protocol Payload for Text Conversation (2005) and its successor protocol as determined by a telecommunications industry standards setting body, such as IETF or the Alliance for Telecommunications Industry Solutions (ATIS). *NPRM*, 31 FCC Rcd at 6271, n.152; see also G. Hellström, P. Jones, RTP Payload for Text Conversation (2005), <https://www.ietf.org/rfc/rfc4103.txt> (RFC 4103 Standard).

²¹ *NPRM*, 31 FCC Rcd at 6273-74, paras. 51-52.

²² *Id.* at 6271, para. 44.

²³ *Id.* at 6262-64, paras. 25-31.

²⁴ *Id.* at 6288-89, para. 91.

²⁵ Unless otherwise indicated, all citations to comments and reply comments in this Report and Order and FNPRM refer to comments and reply comments filed in CG Docket No. 16-145 in response to the *NPRM*. See also *infra* Appendix A, List of Commenting Parties.

²⁶ See *infra* para. 17 (explaining that such obligations are subject to "readily achievable" and "achievable" limitations).

- Amend Part 64 of the Commission’s rules to allow wireless communications support for TRS access, including access via 711 abbreviated dialing through RTT communications, in lieu of support through TTY technology;
- Relieve wireless service providers and equipment manufacturers of all TTY support obligations, including TTY support on legacy wireless networks, to the extent they support RTT on IP facilities in accordance with Commission rules;
- Establish the following criteria defining what constitutes support for RTT:
 - RTT communications must be interoperable across networks and devices, and this may be achieved through adherence to RFC 4103 as a “safe harbor” standard for RTT;
 - RTT communications must be backward compatible with TTY technology; and
 - RTT must support 911 communications;
- Find that RTT is an “electronic messaging service” that is subject to the performance objectives of Parts 6, 7, and 14 of the Commission’s rules, if readily achievable or unless not achievable, as applicable;
- Establish that support for RTT includes support for the ability to initiate and receive calls with the same telephone numbers as are used for voice communications and simultaneous voice and text in the same call session. In addition, recognize that the provision of accessible indicators for call answering and activity, appropriate latency and error rates, and pre-installed and default functionality on end user text capable devices can facilitate making RTT service functionally equivalent to voice communications;
- Amend Parts 6, 7, 14, and 20 to permit manufacturers and service providers, to the extent the latter are responsible for the accessibility of end user devices activated on their IP-based wireless voice communications networks, to ensure that devices that have the ability to send, receive, and display text include RTT capability in lieu of supporting TTY technology, subject to the readily achievable and achievable limitations for Parts 6, 7, and 14, as applicable;
- Establish the following timelines for implementation of RTT for entities choosing to support RTT in lieu of TTY technology:
 - By December 31, 2017, each Tier I CMRS provider and, by June 30, 2020, each non-Tier I provider (except resellers) choosing to support RTT in lieu of TTY over IP facilities shall support RTT either (1) through a downloadable RTT application or plug-in that supports RTT; or (2) by implementing native RTT functionality into its core network, offering at least one handset model that supports RTT, and including the requirement to support RTT in future design specifications for all authorized user devices specified on or after these dates;
 - Manufacturers that provide devices for CMRS providers’ IP-based voice services and that choose to support RTT in lieu of TTY technology shall implement RTT in newly manufactured equipment by December 31, 2018, if readily achievable or unless not achievable, as applicable;
 - By December 31, 2019, each Tier I CMRS provider and, by June 30, 2021, each non-Tier I CMRS provider (including resellers) choosing to support RTT in lieu of TTY over IP facilities shall support RTT for all new authorized user devices;
 - A carrier is subject to the above timelines except to the extent that it is not achievable for a particular manufacturer to support RTT on that carrier’s network. A carrier may rely in good faith on a manufacturer’s representations in this regard;

- Establish consumer outreach and education guidelines to inform the public about the transition from TTY technology to RTT, including how this technology will work.
7. In the FNPRM, we seek comment on:
- Setting an appropriate timeline or trigger for the sunset of service providers' obligation to ensure backward compatibility between RTT and TTY technology, and a proposed date of 2021 for this purpose;
 - Integrating RTT into the provision of TRS;
 - Addressing the RTT needs of people with cognitive disabilities and people who are deaf-blind through the provision of block mode and connectivity with refreshable Braille displays.

III. DISCUSSION

A. RTT is an Effective and Efficient Replacement for TTY Technology

8. Based on the record, we amend our rules governing the obligations of wireless providers and manufacturers to support TTY technology to permit such providers and manufacturers to instead provide support for RTT over wireless IP-based networks.²⁷ In the *NPRM*, we tentatively concluded that the technical and functional limitations of TTY technology, which was developed more than 50 years ago for a circuit switched environment, make that technology unsuitable for providing full and effective access to IP-based wireless telephone networks.²⁸ Commenters overwhelmingly agree.²⁹ Further, there is consensus that TTY technology needs to be replaced with an alternative text technology for IP-based networks.³⁰ As we stated in the *NPRM*, using TTY technology on IP-based networks presents significant challenges to effective communication, including susceptibility to packet loss, compression techniques that distort TTY tones, and echo or other noises that result from the transmission of the Baudot character string.³¹ These issues can degrade quality, increase error rates, and negatively affect the reliability of telephone communications.³² Further, TTY technology is only half-duplex, is inefficient, has a limited

²⁷ See *NPRM*, 31 FCC Rcd at 6257, para. 15; see also *id.* at 6264-70, paras. 32-42 (noting the many advantages of RTT).

²⁸ *Id.* at 6257, para. 15; see also *id.* at 6254-55, paras. 11-12 (describing the limitations of TTYs).

²⁹ See AT&T Services, Inc. (AT&T) Comments at 6-7; Competitive Carrier Association (CCA) Reply Comments at 5; Consumer Technology Association (CTA) Comments at 1; CTIA Comments at 3; California Public Utilities Commission (CPUC) Comments at 1-3; Rehabilitation Engineering Center on Technology for the Deaf and Hard of Hearing (DHH-RERC), Rehabilitation Engineering Research Center on Universal Interface and IT Access (UIITA-RERC), and Omnitor (collectively, "RERCs and Omnitor") Comments at 4, 24-25; Verizon Comments at 2-3; T-Mobile USA, Inc. (T-Mobile) Comments at 1-2; National Association of State 911 Administrators (NASNA) Comments at 1.

³⁰ See AT&T Comments at 3-4; Alliance for Telecommunications Industry Solutions (ATIS) Comments at 1; CCA Comments at 2; CTA Comments at 1; CTIA Comments at 3; Telecommunications Industry Association (TIA) Comments at 1; T-Mobile Comments at 5; Verizon Comments at 2; Boulder Regional Telephone Service Authority (BRETSA) Comments at 1-3; Microsoft Corporation (Microsoft) Reply Comments at 2; Telecommunications for the Deaf and Hard of Hearing, Inc. (TDI), Association of Late-Deafened Adults, Inc., Cerebral Palsy and Deaf Organization, Hearing Loss Association of America (HLAA), and National Association of the Deaf (NAD) (collectively, "Consumer Groups") Comments at 4-5; CSDVRS, LLC. d/b/a ZVRS (ZVRS) Comments at 1.

³¹ *NPRM*, 31 FCC Rcd at 6254, para. 11. See 47 CFR § 64.601(7) (defining Baudot as "a seven bit code, only five of which are information bits"). The definition further notes that Baudot is used by TTYs to communicate with each other at a 45.5 baud rate. AT&T explains that the Baudot character string uses 1400 and 1800 Hz tones that can appear as an echo when transmitted over IP networks. AT&T Petition for Rulemaking at 6-7.

³² *Id.* at 6254, para. 11.

character set, and often requires a separate assistive device.³³ The technical and functional limitations of TTY technology have resulted in a steady decline in its use in favor of other forms of text communications.³⁴ Recognizing these limitations, numerous commenters urge the Commission to update the wireless accessibility requirements and to relieve wireless service providers and manufacturers of their obligations to continue to support TTY technology.³⁵

9. The record also supports adoption of our tentative conclusion that RTT is an effective alternative to TTY technology for the IP-environment.³⁶ RTT is a native IP technology designed for the packet-switched network environment that allows users to make RTT calls using the built-in functionality of numerous off-the-shelf devices.³⁷ Commenters confirm that RTT features, including its full duplex operation, seamless integration of voice and text, international character set, and speed, will greatly improve the availability, efficiency and reliability of text-based communications sent over IP-based networks.³⁸ In addition, RTT has the potential to enhance the ability of TRS to provide functionally equivalent telephone service, while at the same time reducing reliance on some forms of TRS. For example, instead of using captioned telephone service, some individuals might be able to speak directly to each other and in real-time clarify what is being said, if necessary, in text.³⁹ The record thus confirms our tentative conclusions that the deployment of RTT on IP-based networks will offer functionality that is superior to that of TTY technology, and that it will largely eliminate the need for text-reliant users to acquire specialized or assistive devices in order to connect to mainstream wireless technologies.⁴⁰ Further, the DAC unanimously recommended exploration into the use of RTT as a replacement for TTY technology.⁴¹ Finally, all of the major and several smaller wireless service providers already have committed to deploying this technology.⁴²

³³ AT&T Comments at 3-4; *see also NPRM*, 31 FCC Rcd at 6254, para. 11. One exception to this is the Apple iOS version 10, which now has built-in TTY functionality. *See* Apple, *Answer or make TTY calls from your iPhone*, <https://support.apple.com/en-us/HT207033> (last visited Nov. 10, 2016).

³⁴ *NPRM*, 31 FCC Rcd at 6254-55, paras. 11-12 (*citing* Consumer Groups Comments on the *TTY-RTT Transition Public Notice* at 5); DAC October 2015 Recommendations at 1; *AT&T TTY-RTT Transition Waiver Order*, 30 FCC Rcd at 10859, para. 10.

³⁵ *See, e.g.*, CTIA Comments at 3-8; AT&T Comments at 6-7; T-Mobile Comments at 1 (supporting sunset of TTY rules); TIA Comments at 8-9; CTA Comments at 3 (Commission should not require devices to support both TTY and RTT); CCA Reply Comments at 5; *cf.* RERCs and Omnitor Reply Comments at 9 (supporting dropping the requirements to connect TTYs to phones that support RTT natively on VoIP).

³⁶ *NPRM*, 31 FCC Rcd at 6265, para. 33. *See, e.g.*, AT&T Comments at 4; ATIS Comments at 3; CTA Comments at 1; CTIA at 3; Verizon Comments at 2-3 (noting that RTT will facilitate the move to NG911); RERCs and Omnitor Comments at 4, 16; Consumer Groups Comments at 4-5; Disability and Communications Access Board, State of Hawaii (DCAB) Comments at 1.

³⁷ *See NPRM*, 31 FCC Rcd at 6264-65, paras. 32-34.

³⁸ *See* AT&T Comments at 4; ATIS Comments at 3.

³⁹ *See NPRM*, 31 FCC Rcd at 6266, paras. 35-36. In addition, the RERCs and Omnitor maintain that RTT can hasten the use of automated speech-to-text because it will allow both parties to a call to see the text output that is generated. RERCs and Omnitor Comments at 17. This will allow both parties to a call to correct any errors inadvertently produced by speech recognition technology.

⁴⁰ *See NPRM*, 31 FCC Rcd at 6257, para. 15; *see also* RERCs and Omnitor Comments at 16; AT&T Reply Comments at 1; AT&T Comments at 4; ATIS Comments at 3.

⁴¹ DAC Oct 2015 Recommendations at 2; DAC Feb 2016 Recommendations at 1-2.

⁴² *NPRM*, 31 FCC Rcd at 6265, para. 33. *See, e.g.*, AT&T Petition for Rulemaking at 4-5; Verizon Petition for Waiver, GN Docket No. 15-178, at 2 (filed Oct. 23, 2015), <https://ecfsapi.fcc.gov/file/60001330537.pdf>; Cellular South Petition for Waiver, GN Docket No. 15-178, at 2-3 (filed Nov. 23, 2015),

(continued....)

10. We also affirm our tentative conclusion that RTT is a superior accessibility technology to messaging-type text communication services because it provides a more natural and efficient way to meet the communication needs of consumers with disabilities, especially in the event of an emergency, when the need for effective and timely communication with a 911 center is at a premium.⁴³ As we noted in the *NPRM*, because RTT allows instant transmissions and the improved delivery of messages, it is the text alternative that is the most functionally equivalent to voice communication.⁴⁴ Specifically, RTT messages are immediately conveyed to and received by the recipient as the message is composed, as compared to all other text-based messaging services, which require parties to press a key to transmit the message.⁴⁵ This enables the user to see what the other person is typing and begin developing a response before the entire message has been conveyed, similar to voice conversations.⁴⁶ This capability also lets a user know that the other party is indeed responding to the message, which allows for a more direct exchange of information and avoids confusion, crossed answers, and errors.⁴⁷ As several commenters explain, these features are particularly compelling in the context of emergency calls to 911.⁴⁸ The transition to RTT is also expected to help facilitate the transition to NG911 – which will allow the transmission of voice, text and video to public safety answering points (PSAPs) – because broadly supported NG911 standards, such as i3, specify support standards for RTT communications.⁴⁹ Further, RTT has built-in redundancy, the capacity to detect when information is lost, provides a more conversational flow, and avoids the out-of-sequence and delay pitfalls of short message service (SMS) text messaging.⁵⁰

B. Permitting RTT Support in Lieu of TTY Support over IP-Based Wireless Voice Services and Devices

11. In light of the superior qualities of RTT, we adopt rules permitting IP-based wireless providers and manufacturers (hereinafter covered entities) to support RTT in lieu of supporting TTY technology.⁵¹

12. As proposed in the *NPRM*, these rule changes cover only those entities that are involved in the provision of IP-based wireless voice communication service, and only to the extent that their

(Continued from previous page) _____

<https://ecfsapi.fcc.gov/file/60001342786.pdf>; Revised Petition of Competitive Carriers Association for a Waiver, GN Docket No. 15-178, at 1 (filed Apr. 8, 2016), <https://ecfsapi.fcc.gov/file/60001568968.pdf>.

⁴³ See *NPRM*, 31 FCC Rcd at 6269, para. 42; see also *id.* at 6257, para. 15.

⁴⁴ See *Id.* at 6266-67, paras. 37-38 (describing various reasons why RTT is superior to other messaging-type services).

⁴⁵ *Id.* at 6266-67, para. 37. The RERCs and Omnicor report that in Sweden, where both RTT and text access over the public switched telephone network have been provided for the past few years, RTT is considered preferable because of its “smooth and rapid text handling.” RERCs and Omnicor Comments at 20.

⁴⁶ *NPRM*, 31 FCC Rcd at 6267, para. 38.

⁴⁷ *Id.* at 6268, para. 39.

⁴⁸ See AT&T Comments at 12 (RTT to 911 is more efficient than other message-type services); ATIS Comments at 3 (replacing TTY with RTT will improve access to emergency services); West Safety Services, Inc. (West Safety) Comments at 2-3 (explaining RTT reduces response time, allows for simultaneous voice and text, and avoids crossed, out-of-sequence, and delayed messages).

⁴⁹ See Verizon Comments at 2; National Emergency Number Association (NENA) Comments at 2-3.

⁵⁰ See West Safety Comments at 2; RERC and Omnicor Comments at 9, 21-23; Microsoft Reply Comments at 5; Consumer Groups Reply Comments at 6-7; but see BRETSA Comments at 4-11 (agreeing that RTT has benefits, but also noting that SMS-to-911 remains essential and allows for message delivery during network congestion, or insufficient signal for a voice call, supports multitasking and prioritization, and block texting).

⁵¹ Throughout this Report and Order, the term “covered entities” refers to entities that are subject to Part 6, 7, 14, 20, or 64 of the Commission’s rules, as applicable to the section in which this term is used.

services are subject to existing TTY technology support requirements under Parts 6, 7, 14, 20, or 64 of the Commission's rules. Given the relative novelty of RTT, we agree with those commenters who state that it is not appropriate for these rules to apply to entities who were not already subject to an equivalent obligation to support TTY technology.⁵² Commenters also express concerns about extending RTT support requirements to services and products that are not designed for communications interconnected with the PSTN and that are not currently compatible with TTY technology.⁵³ Because this order does not establish specific mandates for wireless providers or manufacturers to support RTT – but rather allows this as an option – we do not believe it is necessary to address these concerns at this time. However, we generally note that our objective in this proceeding is to provide people with disabilities the same tools as individuals using voice communications. More specifically, our priority now is to ensure that RTT enables equal access to communications services only to the extent that they are wireless services that enable a customer to transmit and receive voice calls in both directions to and from PSAPs, TRS call centers, and other PSTN destinations that can be reached through North American Numbering Plan (NANP) telephone numbers. Accordingly, we expect that providers of interconnected VoIP service and manufacturers of equipment used with such service, and not providers and manufacturers of non-interconnected VoIP services and equipment, are more likely to exercise the option to support RTT.⁵⁴

13. *RTT Support over Wireline Networks.* In the *NPRM*, we further sought comment on whether we should amend our rules to require the implementation of RTT in IP-based wireline voice networks.⁵⁵ While several commenters affirmatively support RTT implementation on IP-based wireline networks,⁵⁶ a number of commenters urge the Commission to defer any such requirements, variously claiming that effective alternatives are available to support TTY technology over IP-based wireline voice services,⁵⁷ that RTT standards for wireline services have yet to be developed,⁵⁸ and that unique technical challenges are involved in implementing RTT over wireline networks.⁵⁹ Based on the record, we conclude that it would be premature at this time to address application of RTT to the wireline environment. However, given RTT's superiority to TTY technology, we will keep this docket open to receive further input and conduct continued exploration on the appropriateness of using this technology as

⁵² See, e.g., Microsoft Reply Comments at 5-6 (asking that the Commission issue a further notice of proposed rulemaking should it wish to go beyond the scope of current rules for TTY support); Voice on the Net Coalition (VON) Reply Comments at 4; Verizon Comments at 5; CTA Comments at 2-3.

⁵³ See CTA Comments at 2-4; Microsoft Reply Comments at 3; TIA Comments at 12 (rules should not be tied to whether a device can show text, but rather to devices that enable voice communications that are required to offer TTY solutions); Verizon Comments at 5-6. We note, however, that the proposals in the *NPRM* were limited to providers of *voice* service and manufacturers of equipment used with such voice services – as is the focus of this Report and Order. See *NPRM*, 31 FCC Rcd at 6257, para. 15.

⁵⁴ However, to the extent that a wireless non-interconnected VoIP service provider or equipment manufacturer supports RTT, it will be relieved of the obligation to support TTY technology. See Appendix B, Final Rules.

⁵⁵ *NPRM*, 31 FCC Rcd at 6290, para. 95.

⁵⁶ RERCs and Omnitor Comments at 66-68; VTCSecure LLC (VTCSecure) Comments at 1-2 (RTT on wireline networks would help fulfill congressional objectives of functional equivalence and access); Consumer Groups Comments at 19; NASNA Comments at 3-4 (Commission should consider tying RTT requirement to timing of IP transition for geographic areas). AT&T notes that as part of its preparatory work for the transition from legacy to IP networks, it is conducting a review of accessibility solutions for its customers, and that it “would support a transition to RTT in conjunction with this IP-transition.” AT&T Comments at 16.

⁵⁷ American Cable Association (ACA) Comments at 3; AT&T Comments 15; National Cable & Telecommunications Association (NCTA) Comments at 6; Verizon Comments at 9.

⁵⁸ ATIS Comments at 15; ACA Comments at 4.

⁵⁹ NCTA Comments at 5-6; TIA Comments at 11; Verizon Comments at 9.

an alternative to TTY technology to achieve a universal, integrated text solution for voice service accessibility on wireline IP-based voice services and end user devices.

1. Wireless Service Support for RTT

14. To establish an effective and timely transition to RTT, we amend Parts 6, 7, 14, 20, and 64 of our rules to permit wireless service providers offering IP-based voice communications, in lieu of supporting TTY technology, as follows:

- To support 911 access, pursuant to section 20.18 of the rules, through RTT communications;
- To support RTT over telecommunications services and interconnected VoIP services covered by Parts 6 and 7 of the Commission's rules, if readily achievable;
- To support RTT over interconnected VoIP services covered by Part 14 of the Commission's rules, unless not achievable;
- To support TRS access, pursuant to section 64.603 of the rules, through RTT communications, including 711 abbreviated dialing access.

15. For purposes of this transition, "to support" is defined in a new Part 67 of the Commission's rules as "to enable users to initiate, send, transmit, receive, and display RTT communications in accordance with the applicable provisions of this part."⁶⁰ For the reasons discussed below, we find that the Commission has sufficient legal authority to amend the above rule parts to allow support for RTT in lieu of TTY technology. No commenters dispute that the Commission would be operating within its jurisdiction to adopt such rules.

16. With respect to the rules we adopt pertaining to 911 communications, we affirm that our RTT amendments to section 20.18(c) are within the Commission's general Title III authority to regulate wireless service providers. This is consistent with the Commission's reliance on Title III authority to obligate wireless providers to transmit 911 calls through a means other than a mobile radio handset, for example, through TTYs,⁶¹ as well as the Commission's requirements for wireless providers and interconnected text service providers to support text-to-911 transmissions.⁶² Authority for the 911-related rules we adopt today further stems from section 106 of the CVAA, which directs the Commission to promulgate "regulations, technical standards, protocols, and procedures as are necessary to achieve reliable, interoperable communication that ensures access by individuals with disabilities to an Internet protocol-enabled emergency network, where achievable and technically feasible."⁶³ Finally, the Commission's authority to ensure effective telephone access to emergency services under section 251 of the Act to "designate 911 as the universal emergency telephone number for reporting an emergency to appropriate authorities and requesting assistance,"⁶⁴ the Wireless Communications and Public Safety Act

⁶⁰ See *infra* Appendix B, Final Rules.

⁶¹ See *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, 11 FCC Rcd 18676, 18682, para. 10 (1996) (*E911 1996 Order*) (citing 47 U.S.C. §§ 301, 303(r) as authority for adopting 47 CFR § 20.18, containing rules to improve the quality and reliability of 911 services provided by CMRS providers, including the transmission of TTY calls to 911); see also *id.* at 18680-81, para. 8 (citing 47 U.S.C. §§ 151, the universal service obligation to "promote[e] safety of life and property through the use of wire and radio communications.")

⁶² *Facilitating the Deployment of Text-to-911 and Other Next Generation 911 Applications*, Report and Order, 28 FCC Rcd 7556 (*Bounce-Back Order*), *recon. granted*, 28 FCC Rcd 14422 (2013); *T911 Second Report and Order and Third Further Notice*, 29 FCC Rcd at 9878-80, paras. 71-78.

⁶³ 47 U.S.C. § 615c(g). Section 106 also directs the Commission to implement recommendations proposed by the EAAC, which included proposals for a migration to RTT.

⁶⁴ 47 U.S.C. § 251(e)(3) (designating 911 as the universal emergency telephone number in the United States for both wireline and wireless telephone service).

of 1999,⁶⁵ and the NET 911 Improvement Act of 2008,⁶⁶ support our adoption of RTT as a superior solution for enabling text-reliant users to access 911, given the benefits enumerated above.

17. We next affirm that it is within the Commission's authority under sections 255 and 716 of the Communications Act to amend Parts 6, 7, and 14 of the Commission's rules to permit wireless telecommunications and interconnected VoIP service providers to support RTT in lieu of supporting TTY technology.⁶⁷ Commenters support this approach.⁶⁸ Section 255 of the Act requires telecommunications service providers and manufacturers of equipment used with such services to ensure that their services and equipment are accessible to and usable by individuals with disabilities, if readily achievable.⁶⁹ Section 716 of the Act requires providers of ACS and manufacturers of equipment used for ACS to ensure that such services and equipment are accessible to and usable by people with disabilities, unless doing so is not achievable.⁷⁰ Where accessibility is not readily achievable or achievable, as applicable under these sections, covered providers and manufacturers must ensure that their services and equipment are compatible with existing peripheral devices or specialized customer premises equipment (SCPE) commonly used by individuals with disabilities to achieve access, again, if readily achievable.⁷¹ These "compatibility" requirements further direct that covered products that do not include TTY functionality must support TTYs, if readily achievable.⁷² In creating each of these rules, the Commission acknowledged the possible need to update them as technology evolves.⁷³ Commenters in this proceeding uniformly agree that the technical and functional limitations of TTY technology make it unsuitable for

⁶⁵ Pub. L. No. 106-81, 113 Stat. 1286 (Oct. 26, 1999) (codified at 47 U.S.C. §§ 615-615(b)).

⁶⁶ Pub. L. No. 110-283, 112 Stat. 2620 (Jul. 23, 2008) (codified at 47 U.S.C. §615a-1).

⁶⁷ 47 U.S.C. §§ 255, 617; 47 CFR §§ 6.1, 6.5, 7.1, 7.5, 14.21(d); *see also* NPRM, 31 FCC at 6294-95, paras. 100-110. ACS is defined in the CVAA to include, among other things, both interconnected and non-interconnected VoIP services. 47 U.S.C. § 153(1); *see also* 47 CFR § 14.10(c). However, interconnected VoIP service providers and equipment manufacturers are covered by the accessibility requirements of section 255, rather than section 716, if their services or devices were subject to prior to October 8, 2010, the day of the CVAA's enactment. 47 U.S.C. § 617(f); *see also Implementation of Sections 716 and 717 of the Communications Act of 1934, as Enacted by the Twenty-First Century Communications and Video Accessibility Act of 2010, et al.*, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 14557, 14571, para. 36 (2011) (*ACS Report and Order*). Otherwise, interconnected VoIP service providers and equipment manufacturers are covered by the accessibility requirements of section 716 pertaining to ACS. In addition, sections 251(a)(2) and 716(d) of the Act generally provide that telecommunications and ACS providers, respectively, may not install network features, functions, or capabilities that impede accessibility. 47 U.S.C. § 251(a)(2); 617(d).

⁶⁸ *See e.g.*, AT&T Comments at 8 (supporting the Commission's approach to modifying Part 14 to avoid a patchwork of accessibility solutions for IP-voice services); RERCs and Omnicor Comments at 4-6; Consumer Groups Comments at 4-5.

⁶⁹ 47 U.S.C. § 255(a)-(c); 47 CFR §§ 6.5, 7.5. The Act defines "readily achievable," as "easily accomplishable and able to be carried out without much difficulty or expense." 47 U.S.C. § 255(a)(2), cross referencing 42 U.S.C. § 12181(9). Commission factors for making this determination are found at 47 CFR §§ 6.3(h), 7.3(h).

⁷⁰ 47 U.S.C. § 617(a), (b); 47 CFR § 14.20 (a)(1), (2). The CVAA, which amended the Act to include this obligation, defines "achievable" as "with reasonable effort or expense, as determined by the Commission." 47 U.S.C. § 617. Commission factors for making this determination are found at 47 CFR §§ 14.10(b).

⁷¹ 47 U.S.C. §§ 255(d), 617(c); 47 CFR §§ 6.5(a)(2), (b)(2), 7.5(a)(2), (b)(2), 14.20(a)(3).

⁷² 47 CFR §§ 6.3(b)(3)-(4), 7.3(b)(3)-(4), 14.21(d)(3)-(4) (requiring a standard non-acoustic connection point for TTYs and support for all cross-manufacturer non-proprietary standard signals used by TTYs, subject to the applicable achievability limitations); *see also Implementation of Sections 255 and 251(A)(2) of the Communications Act of 1934, as Enacted by the Telecommunications Act of 1996*, Report and Order and Further Notice of Inquiry, 16 FCC Rcd 6417, 6433-34, paras. 32-33 (1999) (*Section 255 Report and Order*).

⁷³ *See Section 255 Report and Order*, 16 FCC Rcd at 6434, para. 35; *ACS Report and Order*, 26 FCC Rcd at 14647-48, para. 212.

providing full and effective access to wireless networks – both IP-based and legacy networks.⁷⁴ Commenters also recognize RTT as a superior accessibility technology that is effective and efficient in meeting the communication needs of consumers with disabilities.⁷⁵ Congress intended for sections 251, 255, and 716 to ensure access by people with disabilities to our nation’s telecommunications and advanced communications services.⁷⁶ In keeping with our prior commitment to revise Parts 6, 7, and 14 of our rules to keep abreast of new technologies⁷⁷ and our finding that RTT is best suited to replace TTY technology as a means for rendering wireless voice IP services accessible to people who are deaf, hard of hearing, deaf-blind, or speech-disabled, we believe that sufficient legal authority exists to amend the Commission’s accessibility rules to permit telecommunications and interconnected VoIP service providers to support RTT in lieu of TTY technology. We conclude that, given the limitations of TTY technology in an IP environment, this action is necessary to fulfill the intent of Congress, as expressed upon the enactment of the CVAA, to “update the communications laws to help ensure that individuals with disabilities are able to fully utilize communications services and equipment” as these continue to undergo a “fundamental transformation.”⁷⁸

18. Finally, we conclude that the Commission has sufficient authority under section 225 of the Act to amend section 64.603 of the Commission’s rules to permit wireless interconnected VoIP service providers to support TRS access via RTT in lieu of supporting such access via TTY technology. Section 225 of the Act mandates the establishment of nationwide TRS that are functionally equivalent to voice telephone services, and directs the Commission to prescribe implementing regulations.⁷⁹ The obligation to provide TRS, including the obligation to handle calls through abbreviated 711 dialing access, applies to common carriers “providing telephone voice transmission services” and interconnected VoIP service providers.⁸⁰ Section 225 directs the Commission to ensure that TRS is available “in the most efficient manner”⁸¹ and does not require that TRS be exclusively provided via TTY technology;⁸² rather, it expressly directs the Commission to “ensure that regulations prescribed to implement this

⁷⁴ See, e.g., AT&T Comments at 6-7; CCA Reply Comments at 5; CTA Comments at 4; CTIA Comments at 3; RERCs and Omnitor Comments at 4, 24-25; Verizon Comments at 2; T-Mobile Comments at 1-2; NASNA Comments at 1.

⁷⁵ See RERCs and Omnitor Comments at 16; AT&T Reply Comments at 1; CTIA Reply Comments at 10; West Safety Comments at 1; Consumer Groups Comments at 4-5; Verizon Comments at 2-3.

⁷⁶ See, e.g., *Section 255 Report and Order*, 16 FCC Rcd at 6419-21, paras. 1, 4-7 (noting Congress’s interest in ensuring disability access to telecommunications as a means of achieving full participation in society, including access to employment and education); S. Rep. No. 111-386 at 1 (2010) (Senate Report); H.R. Rep. No. 111-563 at 19 (2010) (House Report) (stating that the purpose of the CVAA is to “update the communications laws to help ensure that individuals with disabilities are able to fully utilize communications services and equipment and better access video programming”).

⁷⁷ See *Section 255 Report and Order*, 16 FCC Rcd at 6434, para. 35; *ACS Report and Order*, 26 FCC Rcd at 14647-48, para. 212.

⁷⁸ Senate Report at 1; see also House Report at 19.

⁷⁹ 47 U.S.C. § 225(b)(1), (d)(1); 47 CFR § 64.603; see also 47 U.S.C. § 225(a)(3) (defining TRS as “telephone transmission services that provide the ability for an individual who is deaf, hard of hearing, deaf-blind, or who has a speech disability to engage in communication by wire or radio with one or more individuals, in a manner that is functionally equivalent to the ability of a hearing individual who does not have a speech disability to communicate using voice communication services by wire or radio”).

⁸⁰ 47 U.S.C. § 225(c); 47 CFR §§ 64.601(b), 64.603. “711” is the abbreviated dialing code for accessing a state program TRS provider (not an IP-based TRS provider) from anywhere in the United States. See 47 CFR § 64.601(a)(1).

⁸¹ 47 U.S.C. § 225(b)(1).

⁸² See *id.* § 225(a)(3) (defining TRS).

section encourage . . . the use of existing technology and do not discourage or impair the development of improved technology.”⁸³ We therefore find we have sufficient authority to amend section 64.603 to authorize support for RTT in lieu of TTY technology.⁸⁴ Parties that submitted comments on the application of RTT in the TRS environment express support for this approach,⁸⁵ and no commenter opposes it. To incorporate RTT into the provision of TRS and enable TRS users to reap the benefits of this superior functionality, we amend our TRS rules to permit common carriers and interconnected VoIP service providers, to the extent that they offer service over wireless IP networks, to support the transmission of RTT calls to and from TRS providers, including 711 abbreviated dialing. For the present time, wireless service providers seeking to comply with the TRS access requirement by supporting RTT may do so by ensuring that wireless RTT users’ communications with TRS call centers, via 711 dialing or otherwise, are backward compatible with the TTY technology currently used in such call centers.⁸⁶ In the FNPRM, we seek comment on the adoption of requirements for TRS call centers to incorporate RTT support into their operations.

2. End User Device Support for RTT

19. We next amend our rules to ensure that users of the services described above can access the RTT capabilities of such services. Specifically, we amend section 20.18 to allow new IP-enabled wireless devices used for voice communications that have the capability to send, receive, and display text activated for wireless voice services transmitted over IP facilities⁸⁷ to support RTT in lieu of TTY communications. In addition, we amend Parts 6, 7, and 14 to provide manufacturers of end user equipment for use with wireless interconnected VoIP services with the option of supporting RTT communications in lieu of TTY technology “if readily achievable” or “unless not achievable,” as applicable.⁸⁸

20. Because the record indicates that many existing end user devices may not be capable of supporting RTT through native functionality and that it may be overly burdensome to retrofit existing devices to implement such native functionality,⁸⁹ we do not require service providers and manufacturers to add RTT capability by recalling or retrofitting end user devices already in service or manufactured prior to the applicable compliance dates.⁹⁰ At the same time, the record shows that it may be possible to “push out” downloadable RTT applications to certain existing text-capable user devices that are in service prior to our compliance deadlines.⁹¹ We encourage covered entities to take this step to the extent

⁸³ *Id.* § 225(d)(2).

⁸⁴ *NPRM*, 31 FCC Rcd at 6258, para. 16.

⁸⁵ *See, e.g.*, Hamilton Relay, Inc. (Hamilton) Comments at 1, 13-16; Consumer Groups Reply Comments at 2-3; RERCs and Omnitor Reply Comments at 12-14.

⁸⁶ *See infra* section III.E.2 (discussing backward compatibility obligation).

⁸⁷ Hereinafter we refer to such devices as “text-capable.”

⁸⁸ *See infra* paras. 24-25 (explaining the definitions of “readily achievable” and “achievable” under Parts 6, 7, and 14). This Report and Order does not address end user device requirements under Part 64 because there are no parallel TTY support obligations.

⁸⁹ *See* CTA Comments at 7-8 (because building native RTT functionality into a device is a major change in core functionalities and features, the Commission should refrain from introducing RTT into existing devices manufactured prior to the compliance date); AT&T Comments at 20; TIA Comments at 8; T-Mobile Comments at 9-10; TracFone Wireless, Inc. (TracFone) Comments at 8-9; Verizon Comments at 7; CCA Reply Comments at 4.

⁹⁰ *See* CCA Reply Comments at 5; CTA Comments at 2; TIA Comments at 8; TracFone Comments at 8-9; Verizon Comments at 7; *see also infra* section III.G. (providing timelines for providers and manufacturers to meet the new RTT obligations).

practicable, to help consumers who use IP-based voice services make the transition to RTT technology without necessarily incurring the cost of a new device.⁹²

21. We conclude that the same statutory authorities that provide the Commission with authority to allow RTT support in lieu of TTY support requirements for wireless services provide authority to allow support for RTT on end user devices in lieu of support for TTYs. Specifically, for our amendment of section 20.18, we conclude that the Commission has authority under Title III of the Act, as well as the more recently enacted 911-specific statutory provisions, to permit CMRS providers, in lieu of ensuring that handsets support the connection of TTYs, to ensure that handsets support the transmission of 911 calls through RTT technology.⁹³ For our amendments to Parts 6, 7, and 14, we conclude that the Commission has authority under sections 255, 716, and 106(g) of the CVAA, to provide that end user devices used with wireless telecommunications services over IP facilities and interconnected VoIP services may support RTT in lieu of supporting TTY technology, subject to the “readily achievable” and “achievable” limitations of those provisions.⁹⁴

C. Regulatory Relief

22. In the NPRM, we proposed to eliminate the obligation for wireless service providers and manufacturers to support TTY technology as long as they support RTT.⁹⁵ Service providers and manufacturers seek clarity on whether consequent relief from their TTY obligations will extend not only to IP-based wireless offerings, but to all wireless offerings.⁹⁶ Although this order does not impose a mandate for RTT, we now affirm that covered entities that support RTT in compliance with the

(Continued from previous page) _____

⁹¹ See CTA Comments at 8, n.21 (to the extent required, manufacturers should be able to meet RTT requirements for end user devices already in service through the use of downloadable or over-the-top (OTT) applications); RERCs and Omnitor Comments at 14 (a downloadable application could upgrade older devices that will never obtain native RTT functionality); Letter from Linda Vandeloop, AVP Federal Regulatory, AT&T, to Marlene H. Dortch, Secretary, FCC, CG Docket 16-145 et al, Attach. at 12 (filed Sept. 22, 2016) (AT&T’s downloadable RTT application will support current software versions of the Android (6.0), iOS (9.0), and Windows (10.0) operating systems) (AT&T September *Ex Parte*).

⁹² Cf. AT&T Comments at 20 (allowing a downloadable RTT application may incent service providers to develop an application for existing VoIP capable end-user devices).

⁹³ See *supra* para. 16.

⁹⁴ See *supra* para. 16. Sections 255 and 716 hold service providers responsible for “services” and hold manufacturers responsible for “equipment.” 47 U.S.C. §§ 255, 617. An exception to this, as noted by AT&T, applies when a provider stipulates product specifications, contracts to produce a product or otherwise is extensively involved in the manufacturing process. In such cases, the provider will hold partial responsibility as a “co-manufacturer” for purposes of ensuring compliance with the Commission’s rules governing RTT support for handsets and the devices if such provider opts to support RTT in lieu of TTY technology. See *Section 255 Report and Order*, 16 FCC Rcd at 6454, para. 90; see also *ACS Report and Order*, 26 FCC Rcd at 14587, para. 75. By contrast, under Part 20, the Commission has made a determination that CMRS providers generally have sufficient control over the handsets that they sell to subscribers to warrant placing certain handset-related obligations on such providers. These providers have had a longstanding obligation either to ensure that handsets activated on their networks provide jacks and transmitters compatible with TTY technology, or to make available some other transmitting device capable of being operated in conjunction with TTYs, See e.g., *Bounce-Back Order*, 28 FCC Rcd at 7603, para. 136 (citing *E911 1996 Order*, 11 FCC Rcd at 18682-83, para. 10, 18701, para. 50). Wireless carriers also are required to ensure that a certain percentage of handsets offered to their customers comply with hearing aid compatibility requirements under section 20.19. See 47 CFR § 20.19(c)-(d). The approach taken in this proceeding simply parallels the existing TTY obligation to allow handsets that CMRS providers offer to their subscribers to support RTT access to 911 in lieu of TTY access.

⁹⁵ *NPRM*, 31 FCC Rcd at 6258-59, paras. 16-19.

⁹⁶ AT&T Comments at 6-7; CCA Reply Comments at 5; CTA Comments at 3-4; CTIA Comments at 3; VON Reply Comments at 4; Verizon Comments at 5.

Commission's rules will be relieved of their TTY support requirements on all wireless networks and equipment, including services and devices used for legacy (non-IP) facilities, as of the applicable compliance dates. We are persuaded by commenters that permitting RTT technology to serve as a replacement for TTY technology on IP-based wireless networks is the preferable approach for several reasons, including the declining use of TTYs,⁹⁷ especially with wireless services.⁹⁸ As a consequence, elimination of the TTY support obligation on wireless services is not expected to impose a hardship for text-reliant consumers. Additionally, we are encouraged by the progress being made to move ahead with the swift deployment of RTT, as evidenced by periodic reports submitted by wireless providers in receipt of Commission waivers from the TTY obligations.⁹⁹ Given this progress, we believe that allowing RTT to replace TTY technology on all IP-based wireless services will allow companies to devote greater time and resources to the effective deployment of RTT, instead of continuing to invest in outdated TTY technology.¹⁰⁰

23. Accordingly, we amend our rules to state that any wireless provider or manufacturer covered under Parts 6, 7, 14, 20, and 64 that supports RTT on IP networks in compliance with the RTT support provisions adopted in this Report and Order will be relieved of all TTY support requirement on IP and legacy wireless networks. We conclude that this approach will ensure that people with disabilities can continue to benefit from technological advances that are available to the general public,¹⁰¹ while providing industry with much needed regulatory relief – at a time that meeting TTY support obligations is becoming increasingly difficult in an IP environment.

D. Performance Objectives

24. Currently, wireless providers and manufacturers of equipment covered under section 255 must satisfy accessibility performance objectives if readily achievable under Parts 6 and 7 of the Commission's rules,¹⁰² and if achievable under section 716, pursuant to Part 14 of the Commission's rules.¹⁰³ These performance objectives set forth guidelines to ensure that people with various types of

⁹⁷ See *supra* para. 8; *NPRM*, 31 FCC Rcd at 6254-56, paras. 11-12 (noting that over the past 7½ years, monthly filings of the TRS Fund Administrator have shown a drop of nearly 80 percent in the number of TRS minutes attributed to TTY-initiated relay calls, citing surveys to confirm the decreasing use of TTYs in favor of new technologies in the U.S., and referencing various commenters who confirm that consumers have opted for SMS, instant messaging, e-mail, IP relay and social media applications in place of using TTYs to communicate over wireless services).

⁹⁸ *NPRM*, 31 FCC Rcd at 6255-56, para. 12; see also Verizon Comments at 3; AT&T Comments at 7.

⁹⁹ See, e.g., AT&T October 6, 2016 IP-Voice Accessibility Status Report of AT&T, GN Docket No. 15-178 (filed Oct. 6, 2016), <https://ecfsapi.fcc.gov/file/1006124486713/10-6-16%20ATT%20RTT%20Compliance%20Report.pdf> (AT&T Oct. Progress Report) (confirming its active efforts and expectation to launch an application to perform RTT functionality no later than 2017, and a manufacturer embedded RTT solution in mobile devices by 2018); Verizon Report, GN Docket No. 15-178 (filed Nov. 13, 2016), <https://ecfsapi.fcc.gov/file/60001426649.pdf> (Verizon Feb. Progress Report) (confirming its efforts to ensure interoperable and reliable RTT services on new IP-based wireless networks by the end of 2017); Cellular South Report, GN Docket No. 15-178 (filed June 27, 2016), <https://ecfsapi.fcc.gov/file/10627136013060/Cellular%20South%20TTY%20RTT%20Semi-Annual%20Progress%20Report%20--%20FINAL%20--%202006-27-16.pdf> (Cellular South June Progress Report) (confirming that it will deploy an RTT solution via an application by December 2017).

¹⁰⁰ AT&T Comments at 7 (noting that requiring continued support for TTY technology would be “counterproductive”).

¹⁰¹ This will, for example, fulfill the underlying statutory objectives of section 716 of the CVAA. See *ACS Report and Order*, 26 FCC Rcd at 14559, para. 1.

¹⁰² In Parts 6 and 7, performance objectives are subsumed in the definitions of what it means to be “accessible” and “compatible.” 47 CFR §§ 6.3, 7.3.

¹⁰³ 47 CFR § 14.21.

disabilities are capable of independently accessing and using products and services covered by these parts.¹⁰⁴ In the *NPRM*, we sought comment on our belief that RTT is appropriately classified as an electronic messaging service, a form of ACS that would be independently covered by the accessibility provisions of section 716, and therefore subject to these performance objectives.¹⁰⁵

25. The Act defines an electronic messaging service as “a service that provides real-time or near real-time non-voice messages in text form between individuals over communications networks.”¹⁰⁶ Commenters who responded to this inquiry agree that RTT fits within this definition.¹⁰⁷ In light of this support, and because RTT is similar to other examples of two-way interactive electronic messaging services cited in the legislative history of the CVAA – such as text messaging, instant messaging, and electronic mail – we conclude that RTT is an electronic messaging service for purposes of section 716.¹⁰⁸ Thus, we further conclude that, independent of the rules we adopt in this proceeding with respect to requirements to support RTT in lieu of TTY technology, because of its status as an electronic messaging service, services and equipment used for RTT must comply more generally with the performance objectives contained in Part 14 of our rules unless these are not achievable.

E. Minimum Functionalities of RTT

26. As we proposed in the *NPRM*, we believe that in order to meet the objectives of sections 225, 255, and 716 of the Act, communications services and equipment that support RTT should be as accessible, usable, and effective for people with disabilities as voice-based services over IP-networks.¹⁰⁹ To achieve this goal, we conclude that RTT communications must be interoperable, backward compatible with TTY technology, and capable of supporting certain basic features and capabilities that are routinely available to users of wireless voice services.

1. Interoperability

27. We adopt the *NPRM*'s tentative conclusion that effective RTT communications can only be achieved if the communications transmissions carried across, and the devices used with, various RTT-supporting platforms and networks are interoperable with one another, and we amend our rules to this effect. As we noted in the *NPRM*, the Commission's rules reflect a longstanding commitment to policies favoring the openness of services across providers and devices and the importance of preserving interoperability during technology transitions.¹¹⁰ We further conclude that absent interoperability,

¹⁰⁴ By way of example, one performance objective requires, among other things, that input, control, and mechanical functions be operable without reliance on vision, hearing, or speech and with limited manual dexterity and cognitive skills. 47 CFR §§ 6.3(a)(1), 14.21(b)(1). Another requires that all information necessary to operate and use a product (e.g., images, sounds, and labels) comply with certain specifications designed to make such information available in visual and auditory forms. 47 CFR §§ 6.3(a)(2), 14.21(b)(2). Under Part 14, covered entities can choose to build such accessibility and usability into their services and equipment or can achieve accessibility using third-party solutions that are available to the consumer at nominal cost. 47 U.S.C. § 617(a)(2), (b)(2).

¹⁰⁵ *NPRM*, FCC Rcd at 6285, para. 81; 47 U.S.C. § 153(1).

¹⁰⁶ 47 U.S.C. § 153(19); *see also ACS Report and Order*, 26 FCC Rcd at 14574-76, paras. 42-45.

¹⁰⁷ *See* Consumer Groups Comments at 16; RERCs and Omnitor Comments at 59.

¹⁰⁸ *See* Senate Report at 6; House Report at 23.

¹⁰⁹ *NPRM*, 31 FCC Rcd. at 6270, para. 43.

¹¹⁰ *Id.* at 6272, para. 47 (referencing rules requiring the interconnection of terminal equipment to the telephone network, prohibiting telecommunications carriers and ACS providers from installing network features, functions, or capabilities that impede the accessibility of telecommunications and ACS, and requiring carriers discontinuing a communications service to transition to a newer technology demonstrate that the replacement service provides interoperability).

consumers, TRS call centers, and PSAPs would be burdened with having to support multiple versions of RTT.¹¹¹

28. Commenters agree on the importance of and need for interoperability.¹¹² As AT&T states, “[i]nteroperability across networks and platforms is critical to ensuring that persons who use RTT can switch carriers, networks, and devices without compromising the functionality of RTT or needing to acquire a new device;” it also “promote[s] the adoption of common standards and capabilities and allow[s] RTT users to communicate with other RTT users regardless of their network provider.”¹¹³ Likewise, Consumer Groups assert that interoperability is essential to ensuring functional equivalence and access to all services, in that it can prevent locking users into a single network or service provider, as well as the use of incompatible proprietary standards.¹¹⁴ The Association of Public-Safety Communications Officials-International, Inc. (APCO) adds that interoperability is essential to the efficient transition to advanced technologies used for public safety.¹¹⁵ The RERCs and Omnitor also note the importance of interoperability for emergency services, as well as for having the ability to call and be called by any other users.¹¹⁶

29. We agree with these commenters and are further persuaded by parties who speak to the merits of a common standard in order to achieve interoperability.¹¹⁷ The record supports our tentative conclusion that a common standard can be used to achieve interoperability while preserving technological neutrality and flexibility for the covered entities.¹¹⁸ As we explained in the *NPRM*, this approach provides industry the flexibility to have individual internal RTT standards, so long as they can support the minimum functions and capabilities defined by our rules and can interoperate in a format specified in the common standard (or a mutually agreed alternative) where they connect with other providers’ systems and transport technologies.¹¹⁹ Commenters broadly support use of a safe harbor standard for this purpose and generally prefer it to a single mandated standard for RTT as an appropriate means of achieving interoperability, because it will provide sufficient flexibility for service providers and manufacturers to

¹¹¹ See *id.* at 6271-72, paras. 45-47.

¹¹² See, e.g., ATIS Comments at 4; CTIA Comments at 12; TracFone Comments at 3 (stressing the importance of interoperability to resellers due to their reliance on multiple facilities-based networks outside their control); Verizon Comments at 8; RERCs and Omnitor Comments at 28-29. Comments previously filed in response to the AT&T Petition also reflected a consensus among the parties on the need for a seamless interconnection of RTT services across networks, service providers, and devices. See *NPRM*, 31 FCC Rcd at 6271-72, paras. 45-47.

¹¹³ AT&T Comments at 10.

¹¹⁴ Consumer Groups Comments at 9-10.

¹¹⁵ Association of Public-Safety Communications Officials-International, Inc. (APCO) Comments at 4; see also West Safety Comments at 2-3 (detailing the benefits of end-to-end RTT for enabling improved emergency communications for consumers and PSAPs).

¹¹⁶ RERCs and Omnitor Comments at 28-29.

¹¹⁷ See *NPRM*, 31 FCC Rcd at 6273-74, para. 51; see also AT&T Comments at 10; RERCs and Omnitor Comments at 27-29; Consumer Groups Reply Comments at 3.

¹¹⁸ See, e.g., Consumer Groups Reply Comments at 3-4 (identifying a common standard will help achieve interoperating while incorporating key principles of flexibility and technology neutrality); AT&T Comments at 4-5 (establishing basic foundations of RTT capabilities, such as interoperability, will provide certainty and predictability in developing RTT, but still allow industry flexibility to meet consumer and technology demands). For this reason, we believe that the approach we take effectively responds to CTIA’s request for “flexible, technology-neutral rules” on RTT. See CTIA Reply Comments at 7.

¹¹⁹ *NPRM*, 31 FCC Rcd at 6273-74, para. 51 & n.176 (Proposal R1v3 for Implementation of Real-Time Text Across Platforms, GN Docket No. 15-178, at 7 (filed Nov. 17, 2015) (Proposal R1v3)); see also Consumer Groups Comments at 11.

adapt to changes in technology and consumer demand.¹²⁰ Accordingly, we require that entities that choose to support RTT in lieu of TTY technology must make their services and equipment interoperable over IP-based wireless networks, which can be met by adherence to a common standard, as discussed below.

30. *RFC 4103 Safe Harbor Standard.* We adopt our tentative conclusion that RFC 4103 is the appropriate safe harbor standard for compliance with RTT interoperability requirements and certain performance objectives.¹²¹ In the *NPRM*, we explained that RFC 4103, a non-proprietary, freely available standard that has been widely referenced by leading standards organizations and has been designated for RTT implementation by numerous domestic and foreign carriers as well as emergency communications groups,¹²² has a number of features that make it particularly suitable as a safe harbor standard for RTT.¹²³ Further, designation of RFC 4103 as a safe harbor permits the use of other standards that can meet our performance objectives for RTT.¹²⁴ In addition, our designation of RFC 4103 as a safe harbor does not preclude subsequent modification of this standard to improve performance or interoperability.¹²⁵ Rather, the approach we adopt today provides service providers with sufficient flexibility to develop, use, or transition to an alternative or updated standard for RTT, as long as it supports end-to-end RTT communications and the RTT performance requirements that we adopt herein.

31. Accordingly, as set forth in the rules adopted in this Report and Order, any service or device that enables the initiation, transmission, reception, and display of RTT communications in conformity with RFC 4103 will meet the RTT interoperability requirement.¹²⁶ Because RFC 4103 is subject to modification, we clarify in the final rules that subsequent versions of RFC 4103 or a successor protocol may be used by service providers, by mutual agreement.

¹²⁰ See, e.g., RERCs and Omnitor Comments at 28, 30; Consumer Groups Comments at 10-11; AT&T Comments at 4-5; ATIS Comments at 4; CTIA Comments at 12-14; CTA Comments at 4-5 (noting that the CVAA signaled support for safe harbors); NASNA Comments at 2; T-Mobile Comments at 6-7; CTIA Reply Comments at 6.

¹²¹ *NPRM*, 31 FCC Rcd at 6274, para. 53.

¹²² For example, RFC 4103 has been specified for use by NENA for IP-based next generation emergency text communications where SIP technology is used. NENA Comments at 3. In addition, the Access Board has proposed applying this standard for federal procurements to achieve compliance with the requirements on federal agencies to make their communications services accessible under section 508 of the Rehabilitation Act. *NPRM*, 31 FCC Rcd at 6275, para. 54. See also 29 U.S.C. § 794d (section 508 of the Rehabilitation Act, as amended, requiring federal agencies to procure and use electronic and information technologies that are accessible to people with disabilities).

¹²³ See *NPRM*, 31 FCC Rcd at 6274-76, paras. 53-56; RERCs and Omnitor Comments at 31-36 (discussing useful features of RFC 4103, including the ability to keep transcoding low, the ability to convey RTT in the same hardware as VoIP media, use of the Unicode character set, the provision of built-in redundancy, having bandwidth efficiency, and use of the same transport used for most VoIP and video calls).

¹²⁴ In this regard, we note that even those commenters expressing an interest in being able to use other standards to develop a fully interoperable, end-to-end service recognize the usefulness of the RFC 4103 standard as part of the solution. See, e.g., CTIA Reply Comments at 6-7 (acknowledging support for RFC 4103 as a safe harbor and additional standards used for RTT); ATIS Comments at 4 (discussing ATIS standards supporting RTT, which are based on 3GPP TS 20.163, TS 24.299, and RFC 4103); NENA Comments at 3 (discussing how the i3 standard incorporates RTT, including RFC 4103); T-Mobile Comments at 7 (believing most carriers will implement RTT as defined by RFC 4103).

¹²⁵ See CTIA Comments at 13 (asking the Commission to recognize that implementations conforming to subsequent versions of RFC 4103 will be deemed compliant); T-Mobile Comments at 6-7; AT&T Comments at 4-5; RERCs and Omnitor Comments at 30; Consumer Groups Comments at 11. We also note that no alternative standard is suggested in the record as a safe harbor and that no party suggests that RFC 4103 would be incompatible with other RTT standards.

¹²⁶ See Appendix B, Final Rules.

2. Backward Compatibility with TTY Technology

32. To ensure that TTY-reliant consumers continue to have a method of communicating during the transition to RTT technology, we proposed in the *NPRM* to require wireless service providers to ensure that their RTT technology is backward compatible with TTY technology.¹²⁷ Commenters agree.¹²⁸ As we discussed in the *NPRM*, a migration to RTT without backward compatibility to TTY technology could leave certain people who are still reliant on TTYs without communication options, including persons who cannot afford high speed access, people in rural areas for whom IP service is not available, and senior citizens who might be reluctant to try new technology.¹²⁹ As AT&T notes, without this capability, RTT users would have no accessible means of communicating with friends and family, businesses, medical providers, or pharmacies that use TTYs, would be unable to use state relay service call centers, and would be impeded from securing crucial government services.¹³⁰ Consumer Groups also note that TTYs are still used by many government agencies and that some places of public accommodation (e.g., hotels and hospitals) offer only TTYs as their method for text-based communication.¹³¹ Finally, because many PSAPs are still reliant on TTY technology to receive calls from people with disabilities and it may be a while before they migrate to RTT, enabling RTT users to reach 911 emergency services during the transition period is particularly compelling.¹³²

33. The *NPRM* also sought comment on the feasibility of backward compatibility, how it could be achieved, the possible financial and technical impact on PSAPs, and the appropriate conditions or timing to sunset the backward compatibility obligation.¹³³ No parties suggest that the costs of carrying out a backward compatibility requirement would be burdensome, and the record generally supports the feasibility of implementing this requirement through, for example, the use of gateways and RFC 4103.¹³⁴ However commenters raised two concerns about backward compatibility, both of which we address below.

34. First, some commenters suggest that, to preserve limited network resources, the requirement for backward compatibility should be limited to 911 calls to PSAPs and 711 calls to state TRS call centers. Specifically, ATIS and T-Mobile claim that, if subject to a backward compatibility requirement for all types of calls, carriers would find it necessary to reserve transcoder capacity for every single call – including voice calls – originating on the PSTN and terminating to a device with RTT capability.¹³⁵ According to these parties, such large-scale reservation of transcoder capacity would be

¹²⁷ *NPRM*, 31 FCC Rcd at 6278, para. 62.

¹²⁸ See e.g., Verizon Comments at 8 (interoperability and backward compatibility are fundamental requirements); T-Mobile Comments at 5, 11 (backward compatibility is key for ensuring RTT can reach emergency services and relay services); ATIS Comments at 5; CTIA Comments at 6; TIA Comments at 8; Hamilton Comments at 2-3; Consumer Groups Comments at 4, 12-13; CPUC Comments at 5; NASNA Comments at 2-3; RERCs and Omnitor Comments at 43.

¹²⁹ *NPRM*, 31 FCC Rcd at 6277, paras. 60.

¹³⁰ AT&T Comments at 10-11.

¹³¹ Consumer Groups Comments at 12.

¹³² See NASNA Comments at 2-3; NENA Reply Comments at 2; CTIA Comments at 6; AT&T Comments at 10-11 (the complexity of the 911 system may delay PSAPs' transition away from TTY); APCO Comments at 3-4.

¹³³ *NPRM*, 31 FCC Rcd at 6278-79, paras. 62-63, 65-66.

¹³⁴ See RERCs and Omnitor Comments at 24, 41-42; T-Mobile Reply Comments at 7; NENA Comments at 7-8 (each discussing use of gateways for RTT to TTY conversion to achieve backward compatibility); Hamilton Comments at 8.

¹³⁵ See ATIS Comments at 5; see also T-Mobile Comments at 5; CCA Reply Comments at 5; T-Mobile Reply Comments at n.17 (citing ATIS Comments at 5); Letter from Thomas Goode, General Counsel, ATIS to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145, at 1 (filed Sept. 15, 2016) (ATIS, CTIA, and NENA *Ex Parte*).

necessary because carriers cannot distinguish between PSTN calls originating from TTYs and ordinary voice calls, and because carriers cannot predict in advance whether an RTT-capable device receiving a call from the PSTN will accept it as a voice call or will activate the RTT capability to respond in text.¹³⁶ ATIS and T-Mobile contend that the resulting congestion could cause denial of service for essential 911 and 711 calls placed from RTT devices to PSAPs and state TRS call centers that have not yet converted to RTT.¹³⁷ To ensure that congestion does not prevent RTT calls from getting through to these essential services, they recommend limiting backward compatibility to 911 and 711 calls.

35. Companies that provide emergency communications networks, as well as companies that offer service and equipment to PSAPs that commented in this proceeding, take a different view. They report that they will be able to provide RTT-TTY transcoding specifically for 911 calls, which would eliminate the congestion concern.¹³⁸ Hamilton agrees that any potential denial-of-service problem can be avoided by sending such calls directly to 911 networks and allowing 911 service providers to handle any necessary transcoding for 911 calls.¹³⁹ In addition, Hamilton suggests that state TRS call centers could be set up to receive both RTT and TTY calls, which would minimize – if not eliminate – the need for carrier transcoders to make TRS calls backward compatible.¹⁴⁰ Further, the RERCs and Omnitor assert there is “a suitable method for invoking a gateway only in calls where there is some likelihood that RTT/TTY interworking is needed,”¹⁴¹ which could address the concern that transcoders would need to be reserved for every circuit-switched-to-RTT call. In summary, the record indicates that the denial-of-service concern raised by ATIS and T-Mobile regarding 911 and TRS calls can be avoided by letting transcoding of such calls be performed by 911 service providers or TRS providers. As to the potential difficulties in transcoding other types of calls due to congestion, we believe that ongoing testing should allow service providers to identify and find TTY-RTT and RTT-TTY solutions to the extent that technical issues arise.¹⁴² We note that as the transition to RTT unfolds, we will monitor this issue, and revisit our conclusions if necessary.

36. Second, commenters point out that incompatibilities between RTT and TTY technologies, namely differences in transmission speed, character sets, and other features, may impact

¹³⁶ See ATIS Comments at 5; T-Mobile Reply Comments at n.17 (*citing* ATIS Comments at 5); *see also* ATIS, CTIA, and NENA *Ex Parte* at 1.

¹³⁷ At the start of the RTT transition, many PSAPs will still have their TTY equipment and will need time to transition completely. *See* APCO Comments at 3-4 (PSAPs have obligations to maintain TTY technology and will need time to conduct public outreach and operational preparations before transitioning); NASNA Comments at 2-3; NENA Reply Comments at 2; CTIA Comments a 6; AT&T Comments at 10-11.

¹³⁸ Letter from Mary A. Boyd, VP, Regulatory and Government Affairs, West Safety, to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145 at 1-2, Attach at 5-7 (filed Sept. 30, 2016) (*West Safety Ex Parte*); Letter from Jeffrey A. Wittek, Chief Strategic Officer, Airbus DS Communications, to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145, at 2-3 (filed Oct. 24, 2016) (*Airbus Ex Parte*).

¹³⁹ Letter from David A. O’Connor, Counsel for Hamilton Relay, Inc. to Marlene H. Dortch, Secretary, FCC, CG Docket 16-145, GN Docket 15-178, Attach. at 13 (filed Oct. 24, 2016) (*Hamilton Oct. 24, 2016 Ex Parte*) (illustrating as an example a Text Control Center solution).

¹⁴⁰ Hamilton Reply Comments at 5.

¹⁴¹ RERCs and Omnitor Comments at 41. These commenters point to a 3GPP network specification for this purpose; *see also* Gunnar Hellström, Real-Time Text and TTY interworking in IMS/LTE and various technical environments at 6-7 (2014), <https://tap.gallaudet.edu/IPTransition/Real-Time%20Text%20and%20TTY%20interworking%20in%20various%20technical%20environments.pdf>.

¹⁴² *See* AT&T Reply Comments at 4 (service providers and manufacturers will conduct significant further testing of their RTT services, including incompatibilities of RTT and TTY, and if such incompatibilities create technical issues, manufacturers and service providers can work with affected parties, including PSAPs, to resolve such issue ahead of RTT implementation).

user experience, particularly if the RTT user is unfamiliar with TTY protocols and etiquette.¹⁴³ In conversations between RTT and TTY users, the use of RTT features will be restricted by the limits of the TTY device.¹⁴⁴ This may occur, for example, when individuals who use RTT contact 911 where a PSAP is not RTT-enabled.¹⁴⁵ However, AT&T recommends consumer outreach and education to explain TTY-to-RTT transition issues and any incompatibilities between the two services.¹⁴⁶ AT&T also states that service providers will conduct ongoing testing and that any problems caused by incompatibilities that will require additional intervention will be discovered in time to develop a resolution.¹⁴⁷

37. Given the critical need to ensure the continued ability of RTT users and TTY users to communicate directly with one another,¹⁴⁸ we require that where wireless services and equipment support RTT in lieu of TTY technology, such services and devices shall be backward compatible with TTYs connected to other networks. We conclude that this approach is necessary to ensure telephone access for TTY-reliant callers, and that it may have the ancillary benefit of expediting the adoption of RTT-supported devices, because RTT users will not have to maintain a separate TTY device to communicate with TTY users.¹⁴⁹ With the exception of providing guidance on transliterations between characters, discussed below, we do not address specific solutions to resolve RTT–TTY incompatibility issues, but instead allow service providers and other stakeholders the flexibility to develop their own technical solutions to resolve inconsistencies between the two technologies.¹⁵⁰ We stress that public outreach and consumer education about the transition will play an important role in minimizing any adverse effects that RTT-TTY incompatibilities might have on users.¹⁵¹

38. *Transliteration.* In the *NPRM*, we sought comment on whether we should require a standard transliteration approach or standard table for the transliteration of RTT characters that do not

¹⁴³ See Hamilton Comments at 3-9.

¹⁴⁴ See AT&T Comments at 10 & n.12.

¹⁴⁵ See APCO Comments at 2-3.

¹⁴⁶ AT&T Reply Comments at 3-4; see also APCO Comments at 3 (discussing the opportunity PSAPs had to engage in public outreach and operational preparations before implementing text-to-911).

¹⁴⁷ See AT&T Reply Comments at 4; see also Texas 9-1-1 Alliance, the Texas Commission on State Emergency Communications, and the Municipal Emergency Communications District Association (Texas 911 Entities) Comments at 3 (highlighting the need for testing of RTT at PSAPs); NENA Reply Comments at 2.

¹⁴⁸ See, e.g., AT&T Comments at 10 (“Interoperability with TTY is . . . essential for RTT users to communicate with landline TTY users.”).

¹⁴⁹ In the *NPRM*, we further requested comment on whether other assistive devices, besides TTYs, would benefit from backward compatibility. *NPRM*, 31 FCC Rcd at 6279, para. 64. The RERCs and Omnitor suggest that there are TTY-compatible assistive devices, such as Braille displays used by people who are deaf-blind who could benefit from a backward compatibility requirement. RERCs and Omnitor Comments at 43. Based on this input, and absent any specific information in the record about the need for other forms of backward compatibility, we do not see the need for additional rules to achieve compatibility with other assistive devices at this time. Nevertheless, we encourage covered entities to consult with people with disabilities and their organizational representatives to address the communications needs of individuals who use assistive devices. Likewise, we invite stakeholders to bring any such problems to our attention, and to the attention of the Commission’s DAC, should they arise during the TTY to RTT transition.

¹⁵⁰ In this regard, we note that ATIS is currently voting on a standard that will specify RTT implementation, including guidance on backward compatibility. According to T-Mobile, this will take into consideration industry challenges associated with implementing an automatic answer feature for incoming TTY calls made to RTT-enabled devices. See Letter from John T. Nakahata, Counsel to T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145, GN Docket No. 15-178 (filed Dec. 7, 2016) at 3 (T-Mobile Dec. 7 *Ex Parte* Letter).

¹⁵¹ See AT&T Reply Comments at 3-4; See also *infra* section III.H.

have a corresponding TTY equivalent.¹⁵² We explained that because TTYs can only send and display a small subset of Unicode characters that are available through RTT technology,¹⁵³ gateways between RTT and legacy TTY technologies are needed to convert the much larger Unicode set used with RTT into readable TTY characters. We also asked whether, in lieu of a standard approach, we should allow each covered entity to select its own transliteration approach.¹⁵⁴

39. We will allow use of ITU-T Recommendation V.18, which contains a table showing transliterations from the most commonly used characters in the United States to TTY characters, to serve as a safe harbor for transliterating RTT to TTY characters.¹⁵⁵ While we conclude that this approach, proposed by the RERCs and Omnitor, may provide one effective means of transliterating characters between the two technologies, we also will permit covered entities to choose their own transliteration approach, so long as it can effectively convey the meaning of characters sent to the receiving party. We further encourage use of a standard missing-symbol signal,¹⁵⁶ as well as consumer outreach and education, to help minimize inconsistencies that users may experience as a result of differences between the two character sets.¹⁵⁷ We believe that this safe harbor approach will help prevent communication failures without burdening providers or increasing delays in transmission. This approach should also help address concerns about PSAP confusion from inconsistent gateway transliterations of RTT text through TTY technology, until such time as TTYs are phased out and PSAPs are compatible with RTT technology.¹⁵⁸

40. *Sunset of Backward Compatibility Obligation.* In the *NPRM*, we sought comment on what events or measures should trigger a sunset of the obligation for RTT to be backward compatible with TTY technology.¹⁵⁹ Commenters agree that this obligation should sunset, but vary as to an appropriate deadline. Consumer Groups and the RERCs and Omnitor suggest that as long as consumers still need to connect to the PSTN, TTY technology will need to be supported, as it is the only text-based technology available to people with disabilities that works on the PSTN.¹⁶⁰ The CPUC supports allowing the number of TTY users to diminish through attrition rather than adopting a firm sunset date.¹⁶¹ Hamilton suggests setting the sunset date no earlier than 2025, the date the Commission has determined to sunset certain other device compatibility requirements on the traditional PSTN, including analog-only

¹⁵² *NPRM*, 31 FCC Rcd at 6278-79, para. 63.

¹⁵³ TTYs are capable of transmitting only upper-case letters, numbers, the pound and dollar signs, and some punctuation marks, while RTT technology can transmit and display characters in multiple languages, as well as the vast array of symbols available on computer keyboards. *NPRM*, 31 FCC Rcd at 6278-79, para. 63; *see also id.* at 6265, para. 33.

¹⁵⁴ *Id.* at 6278-79, para. 63.

¹⁵⁵ *See* ITU-T Recommendation V.18, Table A.2 at 25-26, https://www.itu.int/rec/dologin_pub.asp?lang=e&id=T-REC-V.18-200011-I!!PDF-E&type=items (last visited Nov. 2, 2016); *NPRM*, 31 FCC Rcd at 6278-79, para. 63, nn.214-16 (*citing* the Unicode Common Local Data Repository, <http://cldr.unicode.org/index/cldr-spec/transliteration-guidelines>); RERCs and Omnitor Comments at 42; *see also* EAAC, Proposed Procedures for the TTY as a Text Terminal in Legacy 9-1-1 PSAPs without IP Connection at 10 (June 14, 2013), https://apps.fcc.gov/edocs_public/attachmatch/DOC-321704A1.pdf (TTY PSAP Procedures Report).

¹⁵⁶ *See* RERCs and Omnitor Comments at 42 (recommending an apostrophe (') to indicate that something is missing in the conversation).

¹⁵⁷ *See* AT&T Reply Comments at 4.

¹⁵⁸ *See* West Safety Comments at 4-5.

¹⁵⁹ *NPRM*, 31 FCC Rcd at 6279, para. 65.

¹⁶⁰ Consumer Groups Comments at 12-13; RERCs and Omnitor Comments at 43-45 (further recommending that concerted efforts be made to maintain connections with remaining TTY users as this technology is phased out).

¹⁶¹ CPUC Comments at 8.

captioned telephones.¹⁶²

41. Public safety organizations and industry stakeholders suggest various triggering events to sunset TTY obligations based on, e.g., ensuring that remaining users of TTY technology are able to access 911;¹⁶³ regional capabilities;¹⁶⁴ the ability of PSAPs to receive RTT;¹⁶⁵ the implementation of RTT;¹⁶⁶ or market penetration of IP-based services or of RTT-capable handsets.¹⁶⁷ Based on the information provided in the record, and given the uncertainty as to how soon RTT will be universally available and familiar to users of wireline and wireless services, we conclude that it is premature at this time to set a date by which the TTY backward compatibility obligation should expire. In the accompanying FNPRM we seek further comment on the appropriate deadline or event to sunset the backward compatibility obligation.¹⁶⁸

3. Support for 911 Communications

42. The record confirms that RTT's ability to function more like voice communication than TTY – in particular its ability to transmit text as it is created – is especially beneficial in emergency situations when the need for real-time communications is most pressing.¹⁶⁹ Commenters also report that RTT is more reliable than TTYs in an IP environment, allows PSAP call-takers to act on incomplete messages from persons in distress, and by permitting a timely exchange of information, ensures that callers are assured continued contact with a source of help until all necessary communications are completed.¹⁷⁰ The use of RTT is also consistent with the Commission's findings that significant benefits can be attained by enabling people with disabilities to use text to access emergency services by phone.¹⁷¹

43. For the reasons discussed above, CMRS providers transmitting over an IP network that choose to enable the transmission and receipt of communications via RTT – in lieu of TTY technology – to and from any PSAP served by their network, must do so in a manner that fully complies with all

¹⁶² Hamilton Reply Comments at 2 (*citing Technology Transitions Order*, 31 FCC Rcd at 8341-42, paras. 158-59).

¹⁶³ NANSAs Comments at 2-3.

¹⁶⁴ BRETSA proposes that a provider should be allowed to terminate TTY support upon demonstrating that it does not offer exchange telephone service but does offer SMS text-to-911, RTT, or other alternatives to TTY technology. BRETSA Reply Comments at 3. Other 911 providers recommend other triggers for a sunset. *See e.g.*, West Safety Comments at 4 (asking to limit the period for backwards compatibility as much as practicable); NENA Reply Comments at 3 (recommending a sunset in 2020 at the very latest).

¹⁶⁵ AT&T Comments at 10; CTIA Comments at 6.

¹⁶⁶ TIA Comments at 8.

¹⁶⁷ T-Mobile Comments at 12. Alternatively, T-Mobile advocates setting a date certain. *Id.*

¹⁶⁸ *See infra* section IV.A.

¹⁶⁹ *See NPRM*, 31 FCC Rcd at 6293, para. 105. Commenters explicitly recognize and support amending our rules to enable RTT calls for 911 purposes. *See, e.g.*, APCO Comments at 5; AT&T Comments at 12; CTA Comments at 1; Verizon Comments at 2-3 (deployment of RTT for 911 access will facilitate the move to NG911); CTIA Reply Comments at 4, 6; T-Mobile Comments at 5; RERC and Omnitor Comments at 8-9, 46-47; NENA Comments at 1-3; NASNA Comments at 2-3; Consumer Groups Comments at 9, 14; West Safety Comments at 1.

¹⁷⁰ *See e.g.*, BRETSA Comments at 9; West Safety Comments at 2; Verizon Comments at 2; Consumer Groups Reply Comments at 6-7; RERCs and Omnitor Comments at 9, 22.

¹⁷¹ *NPRM*, 31 FCC Rcd at 6261, para. 23 (*citing T911 Second Report and Order and Third Further Notice*, 29 FCC Rcd at 9856-57, para. 20). In this regard, the Commission determined, in part, that the annual economic benefits of reporting cardiac emergencies to 911 calls via text outweighed the costs of obligating wireless providers to transmit text-to-911 calls. The Commission employed this analysis while recognizing that public safety interests are not driven solely by economic considerations. *T911 Second Report and Order and Third Further Notice*, 29 FCC Rcd at 9857, para. 22.

applicable 911 rules.¹⁷² The record shows that the use of RTT for emergency communications is technically and economically feasible in the IP environment.¹⁷³ Specifically, the record indicates that there are a variety of existing options for configuring PSAP systems to receive RTT calls and that many PSAPs have installed or will soon install capabilities that will permit them to accept and effectively process RTT calls.¹⁷⁴ Given the existing capability to support these multiple options for delivery of RTT to PSAPs, we do not find any compelling reason to delay the applicable compliance dates for delivering calls made using RTT to 911 authorities in compliance with the RTT support rules adopted herein. Accordingly, to the extent RTT is the accessibility method chosen, the rules we adopt today require that RTT be delivered without RTT-TTY conversion to PSAPs that are able to receive RTT after the dates specified for compliance by CMRS providers in this Report and Order.

44. Finally, no commenter has suggested that the costs or burdens associated with achieving RTT would be unduly burdensome, and the Commission has previously concluded that the benefits of implementing 911 capabilities outweigh the costs.¹⁷⁵ To ease any associated implementation burdens, we do not prescribe how 911 calls via RTT should reach a PSAP, but rather encourage wireless service providers and 911 authorities to consult with one another to resolve outstanding technical issues without undue delay. For instance, if a PSAP is capable of receiving RTT communications through an enhanced TCC,¹⁷⁶ the approach that we adopt provides a service provider the flexibility to comply with our RTT requirement through such a manner as specified by the PSAP.

45. The Texas 9-1-1 Entities request that wireless providers be required to begin delivering RTT calls to a PSAP in an RTT format (i.e., without converting the call to a TTY format) within six months after a request from the responsible 911 authority.¹⁷⁷ Likewise, West Safety requests that “the Commission secure a commitment from wireless providers to transport RTT to PSAPs after receiving a valid ‘RTT-ready’ PSAP request.”¹⁷⁸ In response, AT&T maintains that PSAPs should be capable of meeting certain prerequisites necessary to receive RTT communications before service providers are

¹⁷² See *supra* para. 16; *infra* Appendix B.

¹⁷³ AT&T Comments at 12-13 (stating that it expects its RTT offerings, including its OTT application, to meet the Commission’s 911 location accuracy requirements); AT&T Oct. 6, 2016 Progress Report at 4 (stating that AT&T has not encountered any insurmountable obstacles to deploying network support for RTT in accordance with its previously stated timetable); Airbus *Ex Parte* at 2 (noting its expectation that its embedded base will be 100% RTT-enabled within two to three years through the NG911 transition).

¹⁷⁴ Airbus *Ex Parte* at 2; Comtech *Ex Parte* at 1, Attach. at 3, 8-9; West Safety *Ex Parte* at 1-2, Attach. at 5. For example, West Safety reports that text control centers (TCCs) used to support SMS-based text-to-911 may be enhanced with minimal modification to support RTT communications. Wireless service providers would then be able to route emergency RTT communications to a TCC gateway, which would route the 911 RTT call to the appropriate PSAP and either configure it to be received by the PSAP’s TTY or deliver it as RTT if the PSAP is RTT-capable. West Safety *Ex Parte* at 1-2, Attach. at 5-8; see also Comtech *Ex Parte* Attach. at 8, 11. A TCC is an aggregation point for text messages to be transmitted to PSAPs. See *T911 Second Report and Order and Third Further Notice*, 29 FCC Rcd at 9866, n.118. An enhanced TCC would include Emergency Services Routing Proxy (ESRP) functionality that would enable the routing of the 911 RTT to a TTY gateway, Web gateway, or directly to an ESInet (for an i3 integrated text-capable PSAP). See West Safety *Ex Parte* at 4.

¹⁷⁵ See *NPRM*, 31 FCC Rcd at 6261, para. 23 & n.80; see also *supra* para. 42; West Safety Comments at 3 (asserting that “the cost and operational burden imposed on PSAPs who add RTT to their existing SMS text-to-911 systems is expected to be incremental because RTT uses the same infrastructure and dedicated connectivity of SMS text-to-911”).

¹⁷⁶ See, e.g., West Safety *Ex Parte* Attach. at 6; see also Comtech *Ex Parte* Attach. at 8.

¹⁷⁷ Texas 911 Entities Comments at 4-5 (urging that this be required to avoid the unintended consequences of unnecessary RTT-TTY conversions).

¹⁷⁸ West Safety Comments at 5.

required to deliver these calls.¹⁷⁹ We agree with AT&T, and amend our rules to require that once a PSAP is so capable, the requested service provider must begin delivering RTT communications in an RTT format within six months after such request is made – to the extent the provider has selected RTT as its accessible text communication method.¹⁸⁰ This timing is consistent with the Commission’s action in the text-to-911 proceeding, where the Commission determined that six months is an appropriate period of time to obligate wireless carriers to support delivery of text-to-911 communications after receiving a request from an individual PSAP.¹⁸¹ So long as a PSAP has taken the necessary measures to support RTT, the record does not contain any justification for delaying the corresponding obligation of wireless carriers to transport RTT communications to that PSAP. In the event that there are compelling reasons why this would not be feasible, a service provider may apply for a waiver from this requirement.

46. *Legacy PSAPs and Gateways.* As explained above, wireless service providers must ensure that RTT is backward compatible with TTY technology so that wireless RTT users can place and receive calls to and from the residual base of TTY users, including “legacy” PSAPs that have yet to convert their call-taking systems to NG911 or other means of supporting RTT communications. Many commenters agree that transcoding gateways offer an effective, feasible, and available means to allow TTY users to reach RTT-enabled PSAPs and RTT users to reach legacy PSAPs.¹⁸² T-Mobile, however, claims that this obligation would shift certain burdens now borne by PSAPs onto wireless carriers by requiring carriers to support such gateways to ensure that 911 calls are delivered to PSAPs via the relevant selective router and, at the same time support TTY (Baudot) media, Automatic Number Identification (ANI), and Automatic Location Identification (ALI).¹⁸³ We disagree. The components of 911 call delivery referenced by T-Mobile are all basic 911 elements that carriers have been required to provide when transmitting calls from TTYs under section 20.18 of our rules.¹⁸⁴ Thus, we do not believe that requiring the delivery of RTT 911 calls with these elements would involve any burden shifting.

47. T-Mobile also claims that wireless carriers should not be held responsible for RTT-to-

¹⁷⁹ AT&T Reply Comments at 7.

¹⁸⁰ AT&T claims that “RTT-RTT communications [with PSAPs] would require a PSAP with NG-911 capabilities and an originating wireless carrier with a direct SIP IP connection to the NG-911 network.” AT&T Reply Comments at 7. However, various 911 providers maintain that RTT-RTT communications with PSAPs are currently feasible through a variety of configurations. West Safety *Ex Parte* at 1-2, Attach. at 5-8; Comtech *Ex Parte* at 1, Attach. at 3, 8-9, 11; Airbus *Ex Parte* at 1-2. In this order, we do not dictate the manner in which RTT-RTT communications must be transmitted to PSAPs, so long as they are otherwise in compliance with the rules adopted herein.

¹⁸¹ *T911 Second Report and Order and Third Further Notice*, 29 FCC Rcd at 9870-72, paras. 47-51. Because our text-to-911 rules are technology neutral, the six-month period applies regardless of whether SMS or RTT is provided. *Id.* at 9867-68, para. 44. Similar to our text-to-911 rules, when a PSAP has taken the necessary measures, it may then make a “valid request” for CMRS providers to deliver 911 texts to it. *See, e.g.*, 47 CFR § 20.18(q)(10)(iii). A “valid PSAP request” means that: (1) the requesting PSAP is, and certifies that it is, technically ready to receive 911 RTT messages; (2) the appropriate local or state 911 service governing authority has specifically authorized the PSAP to accept and, by extension, the covered RTT service provider to provide, RTT-to-911 service; and (3) the requesting PSAP has notified the covered RTT service provider that it is technically ready to receive 911 RTT messages. *Id.* We note that for purposes of RTT messages to 911, a PSAP’s “valid request” would apply only to CMRS voice providers and not to interconnected text providers, which are also “covered text providers” pursuant to Section 20.18(q)(1). *See id.* § 20.18(q)(1).

¹⁸² *See, e.g.*, RERCs and Omnitor Comments at 24; NENA Comments at 7-8 (explaining that legacy PSAPs can be adequately supported via gateway functions, even if carrier gateways may be necessary for five years or more in some cases).

¹⁸³ T-Mobile Reply Comments at 7, n.23 (*citing* NENA Comments at 8).

¹⁸⁴ *See* 47 CFR § 20.18(b) (delivery of 911 calls to PSAPs), (c) (provision of 911 access from TTYs), (d) (delivery of ANI), (e)-(j) (delivery of ALI).

TTY conversion of 911 calls because the gateways for such conversions “will be placed either at the PSAP/ESInet connection point or at the border with the legacy network selective router — in other words, at interworking points that are not within the control of wireless carriers, but are instead controlled by various government agencies or their vendors.”¹⁸⁵ As noted above, providers of 911 services commenting in this proceeding affirm the feasibility of accepting RTT, as well as an eagerness to make this happen, in light of the expected benefits for 911 communications.¹⁸⁶ Given this record and the lack of a basis to conclude that carriers will not be able to transmit and receive communications via RTT to and from any PSAP, including PSAPs that have not yet converted to RTT technology, we reject T-Mobile’s argument.

48. Some commenters note that despite the use of gateways, a mixed RTT-TTY environment may present challenges for PSAPs because of the differences between these technologies.¹⁸⁷ In this regard the Texas 911 Entities note that testing of RTT prior to deployment is essential to ensure a seamless transition, and urge that the results of testing by early-adopting PSAPs be made available to other jurisdictions.¹⁸⁸ We agree that such testing, as well as training of call-takers, will expedite the process of preparing PSAPs and their employees to handle RTT calls in a transitional environment. Therefore, to assist state and local 911 authorities in planning their testing and training activities, we encourage carriers to inform these authorities of their timetables for transitioning from TTY to RTT. We also encourage state and local governments to conduct such testing and training in consultation with consumers, and to share the results with other jurisdictions, to facilitate the transition.¹⁸⁹

49. *Location Accuracy.* The Commission has recognized that the ability of a PSAP to receive accurate location information for callers is of the “utmost importance.”¹⁹⁰ Commenters raise two concerns about the use of RTT to achieve location accuracy. First, one commenter asks whether and how service providers should deliver accurate location information for RTT 911 calls originating on Wi-Fi facilities.¹⁹¹ Second, commenters are split on the feasibility of having downloadable RTT applications

¹⁸⁵ T-Mobile Reply Comments at 7.

¹⁸⁶ See West Safety *Ex Parte* at 1-2, Attach. at 5-8; Comtech *Ex Parte* at 1, Attach. at 3, 8-9, 11; Airbus *Ex Parte* at 1-2.

¹⁸⁷ NENA Reply Comments at 3; Comtech *Ex Parte* at Attach. at 10; West Safety Comments at 4-5. For example, commenters note that TTY technology has limited characters and a slower transmission speed. Comtech *Ex Parte* at Attach. at 10; West Safety Comments at 4-5. APCO expresses concern that PSAPs without IP connectivity could have difficulty if they receive an influx of RTT-to-TTY 911 messages from the general public. Letter from Jeffrey S. Cohen, Chief Counsel, APCO, to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145 (filed Dec. 7, 2016) (APCO Dec. 7 *Ex Parte*). Although we do not believe such an influx is likely, we agree with APCO that any limitations that might be associated with reaching 911 via RTT-to-TTY should be incorporated into consumer outreach and education. See *supra* Section III.H. In addition, as suggested by APCO, we seek comment in the FNPRM regarding how to address contingencies in the event that PSAPs without IP connectivity are adversely affected by such an influx. See *infra* Section IV.A.

¹⁸⁸ See Texas 911 Entities Comments at 2-3 (encouraging that tests be performed and results be made available six months prior to December 31, 2017); see also NENA Reply Comments at 2 (supports testing); Consumer Groups Comments at 14 (support testing); NASNA *Ex Parte* at 1 (Sept. 26, 2016) (noting that Minnesota now has a statewide Emergency Services IP Network (ESInet), which can serve as a pilot project for other states to evaluate RTT delivery).

¹⁸⁹ See, e.g., RERC and Omnicor Comments at 25 (suggesting the NENA Accessibility Group as a key stakeholder for training coordination purposes).

¹⁹⁰ *Emerging Wireline Order and Further Notice*, 30 FCC Rcd at 9488, para. 225 (cited in *NPRM*, 31 FCC Rcd at 6280, para. 69).

¹⁹¹ Texas 911 Entities Comments at 5-6 (explaining the different approaches taken to ascertain the location of the caller by different providers, and noting that some will try to locate the Wi-Fi network location, while others will simply route to the registered address of the caller).

retrieve location information and populate an ALI record, with some parties claiming this is not possible,¹⁹² and others reporting the feasibility of having an RTT app capture location information.¹⁹³

50. Under the Commission's rules, wireless CMRS providers supporting TTY calling to 911 must ensure that location information is provided in accordance with the applicable requirements of section 20.18, and there is no basis in the record to treat RTT calls differently.¹⁹⁴ Given the importance of this feature and that support for RTT replaces our existing requirements for TTY support, we conclude that RTT 911 calls should be subject to the same location information requirements as TTY 911 calls, and we amend our rules accordingly. However, given concerns raised about the feasibility of achieving compliance with this requirement via RTT provided through a downloadable application, we will entertain requests for waivers from this requirement that allege that this is not technically feasible.¹⁹⁵ Such requests will be more favorably viewed if they are supported with evidence documenting such lack of technical feasibility rather than mere assertions of infeasibility.

51. *NSI Devices.* AT&T has expressed concerns that its downloadable 911 application will not be able to fully comply with all applicable 911 rules, including 911 support for non-service initialized (NSI) devices.¹⁹⁶ T-Mobile adds that attempts to accommodate NSI calls to 911 via RTT may present a security risk, by creating an open data connection that potentially can be exploited.¹⁹⁷ Rather than resolve these concerns here, given that the Commission has an open proceeding to sunset or revise rules for 911 calling from NSI devices, we defer consideration of the use of NSI devices for RTT calling to 911 to that proceeding.¹⁹⁸

F. Core RTT Features

52. In addition to seeking comment on interoperability and backward compatibility, the *NPRM* sought comment on a number of other features and capabilities to determine whether to define these as required elements of RTT support by wireless service providers that seek to comply with accessibility rules by supporting RTT in lieu of TTY technology.¹⁹⁹ Specifically, we asked whether such features and capabilities are necessary to ensure that RTT is as accessible, usable, and effective for people with disabilities as wireless voice telephone service is for people without disabilities, and also inquired about the feasibility of providing these features and capabilities by the proposed deadlines.²⁰⁰ A number of commenters agree that RTT capabilities should provide users with certain essential or "core" telephone features that are available to voice users.²⁰¹ However, other commenters, while acknowledging the need for text-reliant users to have access to certain core functions, urge the Commission to be more flexible at this nascent stage of RTT development, and instead to address specific RTT features and functionalities

¹⁹² NENA Comments at 5. NENA also raises concerns about what they refer to as the "less-accurate location information" provided by SMS-based texts to 911, and state that "[t]o repeat the limitations of the interim platform [SMS] would be a tragedy." *Id.*

¹⁹³ *See, e.g.*, AT&T Comments at 12 ("AT&T expects its RTT offerings, including its OTT application, to meet Commission 911 location accuracy requirements.").

¹⁹⁴ *See* 47 CFR § 20.18(d)-(l).

¹⁹⁵ *See id.* §§ 1.43, 1.925.

¹⁹⁶ AT&T Comments at 12-13.

¹⁹⁷ T-Mobile Reply Comments at 6.

¹⁹⁸ *911 Call-Forwarding Requirements for Non-Service-Initialized Phones*, Notice of Proposed Rulemaking, 30 FCC Rcd 3449 (2015) (*NSI Phones NPRM*).

¹⁹⁹ *NPRM*, 31 FCC Rcd at 6280-86, paras. 67-84.

²⁰⁰ *Id.*

²⁰¹ *See, e.g.*, Consumer Groups Comments at 9; RERCs and Omnitor Comments at 25.

under the rubric of the performance objectives of sections 255 and 716, as implemented in Parts 6, 7, and 14 of the Commission's rules, which are required to be met to the extent they are "readily achievable" or "achievable."²⁰² Below we discuss RTT features that can enable an effective and universally integrated text communication service and that are needed to take the place of TTY technology and provide an effective communication alternative to voice communications. We define two of these – initiating and receiving calls via the same ten-digit numbers used for voice calls and simultaneous voice and text – that will be required for entities seeking to support RTT in lieu of TTY technology.

53. *Initiating and Receiving Calls Using RTT.* In the *NPRM*, we proposed that for wireless service providers and manufacturers to meet their accessibility obligations by supporting RTT, their networks and devices must be configured so that RTT communications can be initiated to and received from the same telephone number that can be used to initiate and receive voice communications on a given terminal device.²⁰³ The record generally supports this technology-neutral performance criterion. Specifically, we agree with Consumer Groups that the ability to initiate RTT communications through ten-digit telephone numbers will encourage and promote seamless integration of RTT.²⁰⁴ We further agree that enabling access to ten-digit numbers is necessary to reach and be reached by any other person with a phone number and to ensure that RTT users can access 911 services.²⁰⁵ No commenters question the feasibility of providing this feature, or suggest that it would be overly burdensome.²⁰⁶ Accordingly, we adopt this proposal.

54. *Accessible Indicators.* The *NPRM* asked commenters to identify what features should be incorporated on terminal equipment used by people with disabilities to allow easy activation and operation of RTT functions.²⁰⁷ In response, the RERCs and Omnitor point out the importance of incorporating visual indicators on RTT systems that correspond to basic audio signals in order to receive RTT calls. As an example, they recommend a visual sound bar that can display the volume of the received audio or a simple spot of light that flickers to signal audio activity.²⁰⁸ They explain that this would align with how TTY users today are able to see a status light that indicates ring and busy tones and when the other party transmits audio feed.²⁰⁹ We agree that without an accessible indicator that a call is being received, text-reliant users will not have communications equivalent to voice service, which produces an audio ring or other sounds to alert people who can hear.²¹⁰ While generally supportive of this

²⁰² CTA Comments at 2 (the Commission should not adopt technical mandates but instead adopt achievable performance objectives); AT&T Comments at 9 (asking the Commission not to impose requirements that go beyond the performance objectives in Parts 6, 7, and 14 of the Commission's rules); CTIA Comments at 9 (Commission should codify a basic performance objective so that new wireless services and equipment shall, if achievable, provide RTT capabilities to provide access to core functions and features that are provided to voice based users).

²⁰³ *NPRM*, 31 FCC Rcd at 6280, para. 68.

²⁰⁴ Consumer Groups Comments at 13-14.

²⁰⁵ See *NPRM*, 31 FCC Rcd at 6280, para. 68; Consumer Groups Comments at 14; cf. CTIA Comments at 9-10, n.23 (the telephone numbering requirement is a sufficiently broad performance objective providing guidance without restricting flexibility); see also *NPRM*, 31 FCC Rcd at 6280, para. 68 (citing the DAC's February 2016 Recommendations at 4, which had requested the Commission to consider inclusion of this feature).

²⁰⁶ See RERCs and Omnitor Comments at 45 ("RFC 4103 based RTT is well integrated with the wireless system and phone numbers can be used.").

²⁰⁷ *NPRM*, 31 FCC Rcd at 6285, para. 82.

²⁰⁸ RERCs and Omnitor Comments at 69.

²⁰⁹ *Id.*

²¹⁰ That is, we agree with Consumer Groups' argument that the ability to receive RTT from the same telephone number is an important element to integrate seamlessly RTT communications into consumers' devices and to ensure the accessibility solution is usable by text-reliant users. See Consumer Groups Comments at 13-14.

feature, AT&T requests that a requirement for an incoming RTT indicator become effective only upon the compliance deadlines set for manufacturers and providers to make RTT a native function in devices.²¹¹ Given the importance of this feature for individuals who cannot hear and individuals who can neither hear nor see, we recommend that device manufacturers and service providers incorporate accessible indicators in their RTT implementation to alert users to the receipt of, and audio activity on, an RTT call.²¹²

55. *Simultaneous voice and text.* We adopt our proposal that users of RTT must be able to send and receive both text and voice simultaneously in both directions over IP on the same call session and via a single device.²¹³ The record supports a finding that providing the ability to send and receive simultaneous voice and text is feasible,²¹⁴ is supported by RFC 4103,²¹⁵ and is an essential feature of RTT.²¹⁶ Simultaneous voice and text also can allow for more robust exchanges between RTT users and PSAPs.²¹⁷ Further, it can be particularly beneficial to people for whom speech is their primary mode of communication, but who find it necessary to augment speech with text, such as older adults who have progressive hearing loss, many of whom currently rely on relay services to make telephone calls.²¹⁸ Finally, this feature can prove to be life-saving in emergencies, when a person in distress may want to type out an emergency's exact location to a 911 call taker to ensure accuracy, or when a person is no longer able to speak. We note as well that currently, TTY users have the ability to use both voice and text in the same call session, and so requiring this for RTT implementation will ensure that people with disabilities do not lose access to services they have had, should their providers opt to support RTT in lieu of TTY technology. Accordingly, an essential element of RTT support for entities choosing to support RTT over TTY technology will be the ability of users to have simultaneous voice and text capability on the same call session as of the compliance deadlines for CMRS providers opting to provide RTT support for all new authorized user devices activated on their networks.

²¹¹ See Letter from Linda Vandeloop, AVP Regulatory Affairs, AT&T, to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145, GN Docket No. 15-178 at 1 (filed Dec. 1, 2016) (AT&T Dec. 1 *Ex Parte* Letter).

²¹² In addition to visual alerts, particularly on mobile devices, alerts that vibrate may be appropriate as a user-selectable alternative to alert users who are deaf-blind to the receipt of an RTT call.

²¹³ *NPRM*, 31 FCC Rcd at 6281, para. 73.

²¹⁴ See, e.g., *West Safety Ex Parte* at 1-2 (noting that RTT 911 calls can be routed in a way that would allow both voice and data to be transmitted to PSAPs utilizing existing network elements for SMS text-to-911).

²¹⁵ See *NPRM*, 31 FCC Rcd at 6282, para. 74; AT&T Petition for Rulemaking at 9.

²¹⁶ AT&T Comments at 9 (simultaneous voice and text capabilities and backward compatibility are among the minimum functionality requirements to ensure RTT replaces the functions of and allows for the transition from TTY); RERCs and Omnitor Comments at 53-54; Consumer Groups Comments at 15. While CTIA asks the Commission to avoid mandating capabilities for RTT such as simultaneous voice and text, CTIA Reply Comments at 2, 11, we believe that this feature goes to the very heart of enabling millions of Americans who use their voices and have some residual hearing – but enough hearing loss to need text support – to benefit from RTT.

²¹⁷ See *West Safety* Comments at 2; RERCs and Omnitor Comments at 23; Consumer Groups Reply Comments at 6-7.

²¹⁸ As noted by the RERCs and Omnitor, the “hassle-free use of simultaneous text and speech” is also preferable to the turn-taking that is required when individuals use voice carry over (VCO) and hearing carry over (HCO), two features that are available through TRS. VCO allows a person who can speak, but not hear, to talk for herself during a relay call, but use the relay operator to convey in text what the other party is saying. Conversely, HCO allows a caller who can hear, but not speak, to use the relay operator to verbalize what the caller types, but hear directly what the other party to a relay call responds. In many circumstances, RTT can more efficiently and effectively address the objectives of these types of relay services by allowing point-to-point direct simultaneous exchanges of voice and text. See RERCs and Omnitor at Comments at 20, 53-55 (noting that with RTT, users need not alternate between the callers and the communications assistant); see also *NPRM*, 31 FCC Rcd at 6282, para. 74.

56. *Latency and Error Rate of Text Transmittal.* In the Notice, we proposed that, when transmitted character by character, RTT be capable of transmitting text instantly, so that each text character appears on the receiving device at roughly the same time it is created on the sending device.²¹⁹ To achieve this, we further proposed that RTT characters be transmitted within one second of when generated, with no more than 0.2 percent character error rate for a point-to-point transmission latency that is no greater than that provided for voice communications.²²⁰ The RERCs and Omnitor recommend that RTT implementations using RFC 4103 as a safe harbor or other standards transmit at most 300 milliseconds after text has been generated.²²¹ T-Mobile generally agrees that it is preferable to refer to the latency standard contained in RFC 4103, if used as a safe harbor, but urges that the Commission not specify an absolute maximum latency period that is independent of industry standards.²²²

57. We continue to believe that ensuring a latency and error rate that is functionally equivalent to the real-time nature of voice telephone communications is important to making real-time text effective for text-reliant users. Commenters generally support a latency requirement, although they suggest that it be limited to RTT communications over a service provider's managed network.²²³ We recommend that industry and consumer stakeholders work together to determine appropriate latency and error rate parameters. We believe that this approach will provide much needed flexibility for industry, while minimizing delays and errors that could impede effective communication for people with disabilities.

58. *Device Functionality.* A significant advantage to RTT is that it will allow text-reliant users to select off-the-shelf IP-based wireless devices offered to the general public for their telephone communications.²²⁴ In particular, by providing for the early integration of RTT features into IP-based wireless voice services and devices, people with disabilities will be able to enjoy new wireless services on devices as they emerge for the general public, and will no longer have to go through the burdens and expense of having to locate and purchase specialized text-capable devices, such as TTYs. Integrating RTT early on also is likely to eliminate higher costs that that could be associated with having to incorporate accessibility features at a later stage of a technology's development.

59. The extent to which RTT is successful as a replacement for TTY and as an alternative to voice communications, however, will turn in large part on its ease of use by not only text-reliant users, but also members of the general public with whom they are likely to converse. It is for this reason that various commenters have urged inclusion of RTT as a pre-installed feature of end-user devices that is enabled by a default function. For example, the RERCs and Omnitor maintain that if RTT is provided as an optional downloadable app, "only a fraction of all users would have RTT capabilities, and the major

²¹⁹ See *NPRM*, 31 FCC Rcd 6281, para. 70.

²²⁰ See *id.*; see also Consumer Groups Comments at 14-15; AT&T Comments at 11; NASNA Comments at 3.

²²¹ See Letter from Christian Vogler, Ph.D., Director, DHH-RERC; Gregg C. Vanderheiden, Ph.D., Director, UIITA-RERC, and Gunnar Hellström, Omnitor, to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145, GN Docket No. 15-178 at 2 (filed Nov. 8, 2016).

²²² See T-Mobile Dec. 7 *Ex Parte* Letter at 2-3. T-Mobile explains that because RFC 4103 does not set standards for the time of delivery of a call end-to-end, "it would not be reasonable for the Commission to establish such a mandate, since a carrier does not necessarily control the entire end-to-end path." T-Mobile also recommends that the Commission not set a maximum buffering time of 300 milliseconds – as suggested by the RERCs and Omnitor – because this is only recommended, but not mandated by RFC 4103. In cases of congestion, T-Mobile points out that RFC 4103 acknowledges that buffering up to five seconds may be necessary – which could cause "unpleasant delays in transmission" but would "still be conveyed in the session with some usability."

²²³ See AT&T Comments at 11; CTIA Comments at 7. *Cf.* VON Reply Comments at 2; Microsoft Reply Comments at 4. It is our understanding that this component is addressed through the safe harbor standard RFC 4103, which sets a maximum typing-to-transmission latency.

²²⁴ RERCs and Omnitor Comments at 4, 14; Consumer Groups Reply Comments at 6.

promise of RTT – the ability for any person with or without a disability to call anyone else via RTT . . . would be lost.”²²⁵ In contrast, if RTT is incorporated in a manner that makes it immediately available to potential users, e.g., through a pre-installed app or via native functionality, commenters suggest that it is more likely that RTT will become known and be used by people with disabilities and senior citizens²²⁶ – and thereby fulfill the objective of providing a universally integrated text solution for people with disabilities in the IP environment. Such pre-installed functionality would eliminate the need for text-reliant users to have to take extra steps (e.g., find and install an available RTT application) above what the general public must take to make and answer telephone calls.²²⁷ It would also eliminate problems that could occur if smartphone users who do not have a disability are reluctant to download or activate an RTT app. If such individuals are not be able to answer an RTT call – or to place such a call to a text-reliant user – this could hinder communication between those with disabilities and those without.

60. Making RTT readily and easily available through a native or pre-installed functionality on end user devices can also be of particular importance in emergencies. For example, if callers need to seek help using devices that are not their own, and on which an RTT application may not be present, the consequent delay in securing emergency assistance in another manner may result in their lives being endangered. Further, the record indicates that these apps may not be equivalent to native functionality, and do not have the same potentially life-saving features of RTT.²²⁸

61. Similarly, we are concerned that some of the advantages of RTT as a universal text solution might not be realized if RTT is not enabled by default.²²⁹ Some commenters maintain that a default feature is important to ensuring that the advantages of RTT as a universal text solution are achieved and that users of RTT have an accessible means to call and be called by everyone else. For example, the Consumer Groups claim that implementing RTT by default will help prevent the accidental blocking of RTT calls in the event that a recipient does not know how to enable RTT.²³⁰ Likewise, the RERCs and Omnitor state that default-activated RTT will allow users who need RTT to have calls with anybody else in the same way voice callers can call anyone else.²³¹ AT&T generally agrees with the concept of enabling RTT by default, but suggests the Commission defer adopting rules in favor of the ATIS standards setting process, which is addressing this issue in collaboration with disability rights

²²⁵ RERCs and Omnitor Comments at 15; *see also* Consumer Groups Comments at 8; T-Mobile Comments at 8 (noting that on its network, a native implementation will be more secure and lower risk).

²²⁶ RERCs and Omnitor Comments at 14-15.

²²⁷ *See* RERCs and Omnitor Comments at 15; NASNA Comments at 2; CTA Comments at 6-7 (many downloadable applications that run OTT are connected to third party Wi-Fi access points with unknown service quality, out of the control of the service provider). While CTIA suggests that people with disabilities are accustomed to accessing different functionalities whether offered natively or through downloadable applications, CTIA Reply Comments at 11, it is our objective for RTT capabilities to become universal in IP-based communications, an objective that we believe would be difficult to realize if individuals have to become aware of and download apps to use this feature.

²²⁸ *See* RERCs and Omnitor Comments at 14-15; RERCs and Omnitor Reply Comments at 7 (users of a downloadable RTT application must use a different way to call and use address books); Microsoft Reply Comments at 4 (accessing 911 using an OTT application raises reliability, location accuracy, and call back issues); NENA Comments at 4-5 (expressing concern over how an OTT application would provide certain emergency services, such as location information); CTIA Comments at 16 (downloadable application may not be able to support all of the proposed requirements detailed in the *NPRM*).

²²⁹ *See NPRM* 31 FCC Rcd at 6264, 6266, paras. 31, 35 (discussing the extent to which RTT must be enabled by default in all or most wireless terminal equipment for RTT to be a viable substitute for some forms of relay services); *id.* at 6286, para. 85 (inquiring to what extent it would “make a difference if an RTT application is installed as a “default” app prior to sale of a handset or end user device”).

²³⁰ Consumer Groups Comments at 16; *see also* RERCs and Omnitor Comments at 14.

²³¹ RERCs and Omnitor Comments at 14-15.

groups.²³² CTIA similarly suggests the Commission should provide for flexibility in introducing this new communication service.²³³

62. In order to achieve functional equivalency, it is important for text-reliant users to be able to make and receive communications in RTT with off-the-shelf devices the same way voice users have this capability.²³⁴ While the record indicates that some service providers and manufacturers cannot immediately offer RTT support as an app and others cannot do so via built-in native functionality in end user devices,²³⁵ we strongly encourage covered entities seeking to meet their accessibility obligations by supporting RTT in lieu of TTY technology to take measures that facilitate, rather than discourage RTT use. While we do not impose mandates for RTT to be pre-installed or accessed through a default function at this time, we note that the success of RTT's deployment and use may turn on its ease of use, and that its swift adoption is likely to expedite the date for phasing out requirements for TTY support, including the requirement for RTT to be backward compatible with TTYs. To achieve this end, we encourage collaboration among industry and consumer stakeholders to reach agreement on the appropriate features and technical aspects of RTT implementation.

63. *Calling Features.* In the *NPRM*, in addition to the above elements of RTT, we sought comment on a number of calling features that could enhance RTT's effectiveness as a universally integrated text solution that enables communications equivalent to voice service. For example, we asked about the ability for users to control text settings, such as font size and color.²³⁶ We also tentatively concluded that certain calling features that are commonly available to voice telephone users, are necessary to ensure that RTT is as accessible, usable, and effective for people with disabilities as wireless voice communications service is for people without disabilities, including the ability to transfer calls, enable multi-party conferencing, and utilize automated attendant, interactive voice response systems, and caller identification features.²³⁷ Some commenters urge inclusion of these features,²³⁸ while others raise concerns that technical and practical challenges would prevent their timely implementation.²³⁹ T-

²³² AT&T Reply Comments at 6-7 (noting that pending ATIS standard "Real Time Text Mobile Device Behavior Specification" would allow the receipt of RTT without user action, as well as the ability of users to select whether to use RTT when they make a call); *see also* Letter from David A. O'Connor, Counsel to Hamilton Relay Inc., to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145, GN Docket No. 15-178, at 2 (filed Sept. 8, 2016) (Hamilton Sept. 8, 2016 *Ex Parte*).

²³³ CTIA Reply Comments at 10.

²³⁴ *See* RERCs and Omnitor Comments at 4, 14; Consumer Groups Reply Comments at 6. We acknowledge that future versions of downloadable apps may be able to provide the same functionality as an embedded RTT solution. AT&T Comments at 20.

²³⁵ *See* CTA Comments at 7-8; TIA Comments at 6-7; AT&T Comments at 18; T-Mobile Comments at 10.

²³⁶ *NPRM*, 31 FCC Rcd 6284, paras. 79-80.

²³⁷ *Id.* at 6285, para. 83.

²³⁸ Consumer Groups Comments at 16-17; RERCs and Omnitor Comments at 58-60 (noting that having the option to change character settings is "essential to meet the accessibility requirements of people who are blind or visually impaired, as well as older adults with declining vision" and that "there is no inherent technical limitation that would prevent RTT interfaces from implementing such controls"); *See generally* Proposal R1v3 at 11 (user and character settings may help people who have vision impairments or other disabilities). The need for these calling features to achieve functional equivalence with voice communications was also pointed out by various Commission advisory committees. *See e.g.*, DAC February 2016 Recommendations at 3-4; *see also* EAAC TTY Transition Report at 22-23 (recommending that all telecommunications functions available to voice-based users be made available to users of RTT).

²³⁹ *See e.g.*, AT&T Comments at 16-17, 20, n.29 (requiring voicemail software to be retrofitted could potentially delay RTT implementation); AT&T Reply Comments at 8 (asserting that it is premature to require specific user and character settings in the first generation of RTT); CTIA Comments at 10 (requiring support for emoji or similar

(continued....)

Mobile points out that a flexible approach to handset and network implementation that relies on “open-ended achievability evaluations at the time of initial specification or redesign” is preferable to rules that set out such specifics.²⁴⁰

64. Given that the deployment of RTT is still in its infancy in the U.S., we acknowledge the need for flexibility in its implementation, and agree that specific calling requirements at this time could delay or undermine its deployment.²⁴¹ Accordingly, rather than mandate specific features or capabilities, we note more generally the overarching goal of enabling RTT to serve as a universally integrated accessibility solution that is functionally equivalent to voice communications. In this regard, we find the record persuasive that consideration of the above calling features may be relevant as wireless voice communications service providers and equipment manufacturers work to identify and eliminate barriers to accessibility and usability during the design and development phases of their RTT products and services.²⁴² We also remind companies that Parts 6 and 7 of the rules require inclusion of people with disabilities in market research, product design, testing, pilot demonstrations, and product trials whenever these activities are conducted by entities covered by these sections.²⁴³ Additionally, these rule parts require covered entities to work cooperatively with disability-related organizations, and make reasonable efforts to validate unproven access solutions through testing with such organizations or people with disabilities.²⁴⁴ Further, we remind companies that they have an obligation to keep records of their efforts to implement Parts 6, 7, and 14, including information about their efforts to consult with people with disabilities regarding RTT accessibility features.²⁴⁵

(Continued from previous page) _____

characters is too prescriptive and difficult to reconcile with backward compatibility); ATIS Comments at 6 (adding functions like voicemail and conferencing could delay service providers’ ability to implement and deploy RTT); CCA Reply Comments at 5-6; CTIA Reply Comments at 11. However, the RERCs and Omnitor contend that there is no inherent technical reason why some of these features, such as call transfer and multi-party calls, could not be available for RTT when using RFC 4103. RERCs and Omnitor Comments at 60-63; RERCs and Omnitor Reply Comments at 7-9. Because we do not mandate the provision of these features at this time, we do not make a determination as to their feasibility or achievability, but rather simply acknowledge their importance for a universally integrated text solution in an IP environment.

²⁴⁰ Letter from Kristine Laudadio Devine, Counsel to T-Mobile USA Inc. to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145, GN Docket No. 15-178, at 3 (filed Dec. 2, 2016).

²⁴¹ See T-Mobile Dec. 7 *Ex Parte* Letter at 3; AT&T Dec. 1 *Ex Parte* Letter at 1 (noting as well that sometimes requirements for specific features, such as TTY support, can become outdated). In the *NPRM*, we also sought comment on whether we should require service providers to allow consumers to port RTT-capable wireless devices to other providers to the same extent as they can port devices that provide voice services. *NPRM*, 31 FCC Rcd at 6286, para. 86. Consumer Groups affirm that device portability is “a critical aspect of functional equivalence.” Consumer Groups at 17-18. However, because there is no parallel obligation for voice devices at this time, we refrain from mandating a porting requirement for devices that provide RTT. We further acknowledge points made in the record that device unlocking may affect the ability of a device to retain all of its features when it is migrated to a network using a different base technology. See, e.g., CTIA Comments at 16-17; Verizon Comments at 8-9; RERCs and Omnitor Comments at 29, 62. At the same time, to the extent that voice service capabilities of CMRS handsets are portable, we strongly encourage industry to achieve the same for RTT-capable devices, given that there is no evidence in the record to suggest that the mere inclusion of RTT on a device should inhibit it from being unlocked and transferred to the same extent as voice-capable devices.

²⁴² The approach we adopt here – i.e., to limit certain RTT features to what is achievable or readily achievable – has support in the record. See generally, CTIA Comments at 9; CCA Comments at 2; T-Mobile Comments at 3-4.

²⁴³ See 47 CFR §§ 6.7(b); 7.7(b).

²⁴⁴ *Id.* §§ 6.7(b)(3)-(4); 7.7(b)(3)-(4). See also RERCs and Omnitor Comments at 59 (recommending the involvement of deaf-blind users in the design of RTT interfaces).

²⁴⁵ See e.g., 47 CFR § 14.31(a).

G. Timeline for RTT Implementation

65. In the *NPRM*, we sought comment on when our rules requiring implementation of RTT should become effective.²⁴⁶ We now adopt the compliance deadlines below, in response to comments in the record.

1. Service Providers

66. At present all Commission waivers from the TTY support obligations expire on December 31, 2017, or upon the effective date of rules providing for alternative IP-based wireless accessibility solutions, whichever is earlier.²⁴⁷ To the extent that a service provider prefers to support RTT access in lieu of TTY technology and does not wish to seek an extension of the current waiver, it can meet the following compliance timelines, which will supersede the December 31, 2017 deadline: By December 31, 2017, each Tier I service provider must either (1) offer a downloadable application or plug-in that supports RTT or (2) comply with the following: (i) implement in its core network the capability to support RTT; (ii) offer at least one new handset that supports native RTT functionality, and (iii) for all authorized end user devices specified on or after that date, include in future design specifications the requirement to support RTT.²⁴⁸ For all other (non-Tier I) carriers opting to provide RTT support, such compliance must be achieved by June 30, 2020. A carrier must meet these obligations except to the extent that it is not achievable for a particular manufacturer to support RTT on that carrier's network.²⁴⁹

67. By December 31, 2019, each Tier I service provider opting to support RTT in lieu of TTY technology must provide such support for all new authorized user devices activated on its networks. Non-Tier I service providers (including resellers) that opt to support RTT must do so for all new authorized user devices activated on their networks by June 30, 2021. A carrier must meet these obligations except to the extent that it is not achievable for a particular manufacturer to support RTT on that carrier's network. A carrier may rely in good faith on a manufacturer's representations that it has complied with its obligations under sections 716 and 717 of the Communications Act.

68. These deadlines, which are supported in the record,²⁵⁰ are set in order to accommodate variances in manufacturer product lifecycles, while still ensuring that devices with native RTT

²⁴⁶ *NPRM*, 31 FCC Rcd at 6262-64, paras. 25-31. Among other things, we proposed to require Tier I wireless service providers to complete initial implementation of RTT no later than December 31, 2017, to allow additional time for RTT implementation by all other wireless carriers, and to require RTT capability in certain devices sold for use with IP-based wireless services after December 31, 2017. We also sought comment on whether to require the addition of RTT support to end user devices already in service at "natural opportunities," and whether to allow the use of a downloadable RTT application to constitute compliance with the RTT requirement as an interim solution until native RTT functionality can be built-in or added to handsets and end user devices.

²⁴⁷ See e.g., *AT&T TTY-RTT Transition Waiver Order at 1*; see generally *supra* note 13.

²⁴⁸ For purposes of this rule, "Tier I service providers" refers to CMRS providers offering nationwide service.

²⁴⁹ However, Mobile Virtual Network Operators and other CMRS resellers are not subject to either of these initial deadlines, as they may not be able to support RTT to the extent necessary until after the technology has been implemented by both Tier I and non-Tier I facilities-based CMRS providers. See Letter from Mary Brooner, MB Consulting, LLC, Consultant to TracFone Wireless, Inc., to Marlene H. Dortch, Secretary, FCC, CG Docket No. 16-145, GN Docket No. 15-178, at 1-2 (filed Dec. 8, 2016).

²⁵⁰ See, e.g., AT&T Comments at 16 (supporting a year-end 2017 compliance date if compliance is set to current industry standards); AT&T Oct. Progress Report at 1-2 (indicating AT&T has reached agreements with its network vendors for the software upgrades needed to support its downloadable RTT application). ATIS Comments at 6 (supporting the use of downloadable RTT applications as an interim solution for compliance with the December 2017 deadline); CCA Comments at 4-6; Consumer Groups Comments at 5; RWA Comments at 2-3; T-Mobile Dec 7 *Ex Parte* Letter; Verizon Feb. Progress Report at 5 (indicating Verizon plans to complete development and testing of RTT technology by the end of 2017).

functionality are available by a date certain.²⁵¹ Among other things, they allow CMRS providers that do not fall into Tier I with additional time to comply with the RTT support requirements because they serve small subscriber populations, have fewer device options, often acquire the latest handset models much later than Tier I providers, and have limited influence on the technical ecosystem and standards setting.²⁵² We expect that handsets offered pursuant to these timelines will be compatible with at least the current versions of the operating systems available on text-capable handsets offered for sale by the service providers.

2. Manufacturers

69. In the *NPRM*, we proposed that handsets or other text-capable end user devices sold after December 31, 2017, should have RTT capability.²⁵³ We sought comment on this proposal and whether the deadline should more appropriately be based on the date when new devices are manufactured.²⁵⁴ In response to TIA's assertion that manufacturers generally have control over the point of manufacture, but not the point of sale or distribution channels, we conclude that the compliance date for manufacturers wishing to support RTT in lieu of TTY technology should be based on the date after which new equipment is manufactured.²⁵⁵ We agree that sales are often made through wireless service providers or retail establishments that are not under the control of the manufacturers.²⁵⁶ The record also supports setting the compliance date for manufacturers as December 31, 2018.²⁵⁷ Therefore, we require manufacturers opting to provide RTT support, in lieu of supporting TTY technology, to provide RTT functionality in handsets and other text-capable end user devices for wireless IP-based voice services, subject to the readily achievable or achievable limitation, as applicable, for all devices manufactured on or after December 31, 2018.

3. Other Compliance Deadlines and Related Matters

70. *Natural Opportunities.* Although all compliance timelines contained in this section are prospective only, in that they do not require covered entities to retrofit "in-service" devices, pursuant to Parts 6, 7, and 14, entities covered under sections 255 and 716 are required to meet accessibility

²⁵¹ See T-Mobile Comments at 9-10 (recommending a phase-in schedule to deploy RTT-capable handsets that recognizes device lifecycles); Consumer Groups Comments at 7 (devices sold after the RTT implementation date must have RTT capabilities to ensure such devices actually are available to consumers).

²⁵² See Consumer Groups Comments at 6; RWA Comments at 2-3; CCA Comments at 4-6; *see also NPRM*, 31 FCC Rcd at 6263, para. 27. For wireless service providers other than CMRS providers that are subject to RTT support requirements under one or more provisions of Parts 6, 7, 14, and 64, the same implementation deadlines apply to such providers as are applicable to smaller CMRS providers.

²⁵³ *NPRM*, 31 FCC Rcd at 6263, para. 28.

²⁵⁴ *Id.*

²⁵⁵ See TIA Comments at 8.

²⁵⁶ As noted above, wireless service providers, regardless of their size or designation as CMRS providers, that are extensively involved in the manufacturing process such as by "providing product specifications" or "contracting to . . . make or produce a product" are also required to comply with manufacturer obligations for both handsets and other end user devices used with their IP-based voice services, in accordance with the timelines set forth in this section. See *supra* note 94.

²⁵⁷ See RERCs and Omnitor Comments at 14 (advocating a date certain where all phones manufactured after that date provide native RTT implementation); CTA Comments at 7 (suggesting December 31, 2018, as the earliest compliance date for the manufacture of RTT compliant devices); TIA Comments at 6-7 (recommending the Commission adopt a flexible deadline for implementation that is a minimum of 12 months beyond what is required for Tier I wireless service providers); AT&T Comments at 18-19 (requiring compliance for devices manufactured after a date certain that allows like treatment of like devices, reduces consumer confusion, and meets industry expectations).

obligations as natural opportunities occur, i.e., “upon the redesign of a product model or service, new versions of software, upgrades to existing features or functionalities, significant rebundling or unbundling of product and service packages, or any other significant modification that may require redesign.”²⁵⁸ As discussed earlier, we encourage covered entities, to the extent practicable, to “push out” downloadable apps or upgrades to operating systems to any in-service handsets that can support those apps or upgrades after each applicable compliance deadline.²⁵⁹

71. *Relief from TTY support obligations.* As discussed above, we clarify that a wireless service provider or manufacturer in compliance with the RTT obligations adopted in this Report and Order will be relieved of its TTY support obligations on all wireless networks and equipment, including services and devices used for legacy (non-IP) facilities.²⁶⁰ We sought comment in the *NPRM* on whether TTY support obligations should terminate on the applicable compliance deadline or whether additional flexibility should be provided to allow relief from TTY support obligations prior to the applicable RTT compliance deadline.²⁶¹ In the ordinary course, this relief will occur as of the applicable implementation deadline of the covered entity’s initial RTT support requirement. However, to provide an incentive for early implementation of RTT, we will allow for simultaneous relief. Therefore, a provider or manufacturer that achieves early compliance with the RTT support requirements will be relieved of these obligations as of the date upon which such provider or manufacturer achieves such compliance. We further provide that, for those carriers currently subject to a limited waiver of their TTY support requirements that would expire prior to their earliest applicable RTT compliance date, we extend the waiver to that date.²⁶²

H. Education, Outreach, and Notifications

72. Technology transitions generate the need for consumer education.²⁶³ In this section, we establish guidelines for informing the public about the transition from TTY technology to RTT and the mechanics of how RTT technology will work, as proposed in the *NPRM*.²⁶⁴ These guidelines are designed to facilitate a seamless transition from TTY technology to RTT by ensuring that the public has the information it needs to effectively utilize RTT as a universally integrated text solution in the IP environment.²⁶⁵ We note that these guidelines are recommendations rather than requirements because we understand that industry stakeholders plan to effectively inform the public about the upcoming transition. We also choose guidelines over mandates to provide service providers and manufacturers with flexibility in conducting their consumer outreach and education, and because we believe that service providers and

²⁵⁸ See 47 CFR §§ 6.7, 7.7, 14.20; see also *ACS Report and Order*, 26 FCC Rcd at 14609, para. 124; *Section 255 Report and Order*, 16 FCC Rcd at 6447, para. 71; see also *NPRM*, 31 FCC Rcd at 6262, para. 29.

²⁵⁹ See *NPRM*, 31 FCC Rcd at 6263-64, para. 29-31; cf. RERCs and Omnitor Comments at 14 (downloadable applications are a reasonable solution for devices already in existence that cannot be appropriately updated for native RTT functionality); AT&T Comments at 19-20 (downloadable RTT applications may be the only way to provide RTT on existing devices).

²⁶⁰ See *supra* para. 22; see also *NPRM*, 31 FCC Rcd at 6252-53, para. 9.

²⁶¹ *NPRM*, 31 FCC Rcd at 6262-63, paras. 26-27.

²⁶² For example, under the terms of the limited waiver granted to the Competitive Carriers Association (CCA) members, the waiver relief would expire either December 31, 2017, or upon the effective date of these rules, whichever is earlier. *CCA Petition for Waiver of Rules Requiring Support of TTY Technology*, Order, 31 FCC Rcd 3778, para. 1 (CGB PSHSB WTB WCB 2016). For the reasons discussed above, we now provide that the limited waiver relief for these carriers is extended until their first RTT compliance date of June 30, 2020.

²⁶³ See *Technology Transitions Order*, 31 FCC Rcd at 8349, para. 180.

²⁶⁴ *NPRM*, 31 FCC Rcd at 6288-6290, paras. 91-93.

²⁶⁵ See AT&T Reply Comments at 3-4 (outreach and education will help with user experience in RTT to TTY transition); Consumer Groups Comments at 18-19; RERCs and Omnitor Comments at 65.

manufacturers have strong business incentives to ensure consumers are well informed about the introduction of this new technology.²⁶⁶

73. *Outreach Guidelines.* We encourage consumer outreach and education efforts to include (1) the development and dissemination of educational materials that contain information pertinent to the nature, purpose and timelines of the RTT transition; (2) Internet postings, in an accessible format, of information about the TTY to RTT transition on the websites of covered entities; (3) the creation of a telephone hotline and online interactive and accessible service that can answer consumer questions about RTT;²⁶⁷ and (4) appropriate training of staff to effectively respond to consumer questions.²⁶⁸ All consumer outreach and education needs to be provided in a manner that is accessible to individuals with disabilities.²⁶⁹ Accessible formats include, but are not limited to, large print, Braille, videos in American Sign Language and that are captioned and video described, e-mails to consumers who have opted to receive notices in this manner, and printed materials.²⁷⁰ We encourage service providers and manufacturers to coordinate with consumer, public safety, and industry stakeholders to develop and distribute education and outreach materials.²⁷¹ We further direct the Commission's Consumer and Governmental Affairs Bureau (CGB) to implement an outreach plan to complement industry's efforts to fully inform the public about RTT.

74. The Commission also adopts its proposal to have the notice conditions imposed in the Bureau's waiver orders remain in effect until the full implementation of the rules adopted in this proceeding.²⁷² The continued provision of this information is necessary to ensure consumers with disabilities do not expect that TTY technology will be supported by IP-based wireless services when

²⁶⁶ See *Technology Transitions Order*, 31 FCC Rcd at 8349, para. 181; see also APCO Comments at 3 (noting that PSAPs need time to conduct public outreach and operational preparation in for the TTY to RTT transition); AT&T Reply Comments at 3-4; CTIA Comments at 19 (the Commission does not need to mandate specific outreach and education, because RTT will be included in the wireless industry's general outreach efforts); NENA Comments at 10 (NENA commits to using its consumer education experience to aid in public education efforts); CTIA Reply Comments at 14-15.

²⁶⁷ Alternatively, covered entities may want to consider coordinating to provide regional or national services that can answer questions about the transition, to which its websites can provide a link.

²⁶⁸ *NPRM*, 31 FCC Rcd at 6288-90, paras. 91-93; see also *Technology Transitions Order*, 31 FCC Rcd at 8349, para. 181 (describing similar requirements for discontinuance of service notices). To the extent that telephone hotlines are utilized, we recommend that these be available during regular business hours to answer questions regarding the RTT transition. *NPRM*, 31 FCC Rcd at 6289-90, para. 93. Service providers and manufacturers should also make such materials available in languages other than English, particularly in areas where the service provider or manufacturer regularly uses a language other than English in its communications with its customers. Consumer Groups Comments at 18-19; see also 47 CFR § 11.21 (requiring emergency alert plans to include information on actions taken by Emergency Alert System (EAS) participants to ensure timely access to EAS alert content by non-English speaking populations).

²⁶⁹ 47 CFR §§ 6.11, 7.11, 14.20(d) (requiring information and documentation about covered services and equipment to be available and accessible to individuals with disabilities); Consumer Groups Comments at 18-19.

²⁷⁰ *NPRM*, 31 FCC Rcd at 6289, para. 92; Consumer Groups Comments at 18-19.

²⁷¹ *NPRM*, 31 FCC Rcd at 6289, paras. 91-92; AT&T Reply Comments at 4; CTIA Reply Comments at 14-15; Hamilton Comments at 9; NENA Comments at 10-11.

²⁷² *NPRM*, 31 FCC Rcd at 6289, para. 92. These conditions include a requirement for waiver recipients to apprise their customers, through effective and accessible channels of communication, that (1) until TTY is sunset, TTY technology will not be supported for calls to 911 services over IP-based wireless services, and (2) there are alternative PSTN-based and IP-based accessibility solutions for people with communication disabilities to reach 911 services. These notices must be developed in coordination with PSAPs and national consumer organizations, and include a listing of text-based alternatives to 911, including, but not limited to, TTY capability over the PSTN, various forms of PSTN-based and IP-based TRS, and text-to-911 (where available).

calling 911 services, to educate consumers about the availability of RTT, including its limitations when communicating with PSAPs that have only TTY capability,²⁷³ and to ensure these consumers know alternative accessible telecommunications options exist for this purpose.²⁷⁴ These notifications should also be provided in formats that are fully accessible to consumers with disabilities.²⁷⁵

IV. FURTHER NOTICE OF PROPOSED RULEMAKING

75. In this FNPRM, we seek further comment on an appropriate timeline to sunset the RTT-TTY backward compatibility requirement, requiring TRS providers to integrate RTT into TRS operations, and the need for certain RTT features to address the communications needs of people with cognitive disabilities or people who are deaf-blind.

A. Establishing a Deadline to Sunset the Obligation to Ensure RTT is Backward Compatible with TTY Technology

76. In the Report and Order, we conclude that it is premature to establish a deadline to sunset the obligation to ensure that services and equipment that support RTT is backward compatible with TTY technology, until we have gathered additional information about the deployment and effectiveness of the transition from TTY to RTT technology.²⁷⁶ We believe that collecting such information will be useful for a Commission determination as to when TTY users have transitioned to RTT to a point that warrants elimination of the backward compatibility requirement. To this end, we seek comment on the type of data and metrics that can be used to monitor the availability, adoption, and acceptance of RTT services and devices. For example, would it be useful to gather data on the total number of end user devices supporting RTT that are made available for sale? Would it also be helpful to track the adoption of RTT on services and devices used by PSAPs, government entities, and businesses? To assess the impact of RTT on PSAPs without IP connectivity, should we track the frequency of RTT-to-TTY 911 calls, and how should we address contingencies if there is an adverse impact?²⁷⁷ To what extent can service providers also gather data on RTT usage by consumers? Next, we seek input on when and how such data should be reported. We currently require wireless service providers who have been granted waivers of our TTY obligations to report to the Commission semi-annually on the progress of their RTT implementation efforts.²⁷⁸ Should we require similar reports of wireless and wireline service providers and manufacturers? Should certain actions, such as the grant of a waiver, trigger a reporting requirement? Alternatively, should any reporting requirement be postponed until after the requirements for the wireline transition have been adopted? Are there other reports collected by the Commission through which we should collect this or similar information on RTT?

77. We note that by 2021, Tier I wireless service providers will have had the opportunity to support RTT on their IP-based networks for three years, manufacturers will have been producing RTT-compliant equipment for two years, and smaller wireless service providers will have supported RTT on their network for at least 18 months.²⁷⁹ For these reasons, and because by such date, we expect to have data sufficient to assess adoption of RTT technology, we propose to set a sunset date for RTT-TTY backward compatibility of 2021 unless the Commission finds a reason to extend this deadline. We seek

²⁷³ See APCO Dec. 7 *Ex Parte* at 2 (advocating consumer education regarding limitation of RTT-to-TTY 911 communications).

²⁷⁴ NPRM, 31 FCC Rcd at 6289, para. 92; cf. RERCs and Omnitor Comments at 65.

²⁷⁵ Consumer Groups Comments at 18-19.

²⁷⁶ We noted that commenters' opinions on an appropriate sunset date varied considerably. See *supra* paras. 40-41.

²⁷⁷ See APCO *Ex Parte* at 2 (citing potential burden of RTT-to-TTY influx on PSAPs without IP connectivity).

²⁷⁸ See *supra* note 99 (listing providers subject to this reporting obligation, and describing various progress reports received to date that shed light on progress made on the implementation of RTT).

²⁷⁹ See *supra* section III.G.

comment on this proposal, and whether there is a different point in time when it would be appropriate for the Commission to reassess the need for covered entities to continue supporting TTY technology via backward compatibility on their IP-based voice service networks. For example, should our reassessment be tied in any way to the implementation of the deployment of RTT technology over wireline networks, or should this reassessment take place after the sunset of the PSTN and the transition of all consumers to IP-based wireless *and* wireline networks?

B. Requirements for TRS Providers

78. In the Report and Order, we allow wireless service providers to support TRS access through RTT technology, including via 711 abbreviated dialing access, in lieu of supporting TRS through TTY technology.²⁸⁰ We further clarify that wireless service providers transmitting such calls may comply with these RTT support requirements by ensuring that such communications are backward compatible with the TTY technology currently used in such call centers.²⁸¹ This approach is designed to ensure that RTT users can place and receive TRS calls through state TRS program call centers even when such centers are not equipped to receive RTT calls.

79. Some forms of TRS are provided over the PSTN,²⁸² while others are made available via IP networks.²⁸³ In the *NPRM* preceding the Report and Order, we expressed our belief that RTT can be used to enhance the ability of TRS to provide functionally equivalent telephone service, and sought comment on how to integrate RTT into the provision of TRS.²⁸⁴ For the traditional form of TTY-based TRS, such integration would enable state program call centers to receive RTT calls directly, without having them converted to TTY communications.²⁸⁵ Further, we sought comment in the *NPRM* on whether and how we should amend our TRS rules to authorize or require other forms of TRS to incorporate RTT capabilities into platforms and terminal equipment used with these services.²⁸⁶

80. Comments in the record express a variety of views as to the manner in which RTT should be integrated into TRS operations. Some TRS providers suggest that the Commission should allow, but not require, Internet-based TRS providers to support RTT voluntarily.²⁸⁷ Others suggest that RTT should not become a substitute for TRS, but rather an add-on feature.²⁸⁸ While agreeing that RTT should “not be viewed as a wholesale substitution for other forms of TRS,” Hamilton Relay, a provider of state-based

²⁸⁰ See *supra* para. 18.

²⁸¹ See *supra* para. 18.

²⁸² PSTN forms of TRS include TTY-based service, speech-to-speech service (STS), and captioned telephone service (CTS). See 47 CFR §§ 64.601(a)(30) (defining STS), (a)(33) (defining TTY); *Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Declaratory Ruling, 18 FCC Rcd 16121 (2003) (*CTS Declaratory Ruling*) (recognizing CTS as a form of TRS).

²⁸³ IP-based forms of TRS include video relay service (VRS), IP captioned telephone service (IP CTS), and IP relay service (IP Relay). See 47 CFR §§ 64.601(a)(16) (defining IP CTS), (17) (defining IP Relay), (40) (defining VRS).

²⁸⁴ *NPRM*, 31 FCC Rcd at 6283, para. 78.

²⁸⁵ See *supra* para. 36 (noting that differences in speed and character sets can create incompatibilities in RTT to TTY communications).

²⁸⁶ *NPRM*, 31 FCC Rcd at 6283-84, para. 78. We also sought comment on the following: whether we should authorize or require IP Relay or other TRS providers to support an RTT mode between the user and the communications assistant (CA); whether we should authorize or require IP CTS or other TRS providers to support RTT transmission in any voice channels they provide and in any off-the-shelf equipment provided to IP CTS users; and whether we should authorize or require VRS providers to support an RTT mode between the user and the CA, so that RTT can be used to supplement communications in sign language with text during VRS calls. *Id.*

²⁸⁷ See e.g., ZVRS Reply Comments at 2-3.

²⁸⁸ See Sorenson Comments at 7; Hamilton Comments at 13-15; Hamilton Reply Comments at 10.

TRS, maintains that TRS providers should enable their technology to allow for direct RTT calling.²⁸⁹ Likewise, Consumer Groups urge the Commission to require TRS providers to support RTT, claiming that the effective integration of RTT into TRS is essential to RTT's widespread accessibility and larger integration into the mainstream telecommunications ecosystem.²⁹⁰ The RERCs and Omnitor similarly support incorporating RTT into TRS to achieve telephone service that is functionally equivalent to voice communication services, and suggest that requiring interoperability between wireless RTT and TRS will allow consumers to use the same equipment for user-to-user calls, VRS calls, and text relay calls and to select the appropriate type of relay service, depending on the situation.²⁹¹

81. The record in this proceeding contains extensive information about the benefits of RTT. As noted in the Report and Order, commenters report that the deployment of RTT on wireless IP networks will offer various functionalities that are superior to those available with TTY technology, including full duplex operation, seamless integration of voice and text, the international character set, and faster transmission speeds.²⁹² In addition, we note that RTT will greatly improve the availability, efficiency and reliability of text-based communications sent over IP-based networks.²⁹³ It would appear, therefore, that integrating RTT into TRS operations similarly would benefit text-reliant users. Moreover, by allowing TRS users to benefit from improved communications technologies, it would fulfill a congressional directive to the Commission to ensure that TRS regulations "encourage . . . the use of existing technology and do not discourage or impair the development of improved technology."²⁹⁴ In other words, taking this action will ensure that TRS users are able to benefit from evolving technologies in what will eventually be an all-IP environment.

82. However, before adopting rules governing the provision of RTT as an integrated component of TRS, we seek additional comment on the costs, benefits, and technical feasibility of enabling this feature for various forms of TRS, for both TRS providers and TRS users. For example, what changes would be needed in TRS equipment (e.g., hardware, software, or applications) to support RTT between an IP-based TRS user and the CA or between the parties to the call? Will adoption of an RTT mandate require TRS providers or users to purchase new TRS equipment or updates to TRS equipment software? To what extent will providers have to modify their call routing and handling features?

83. Additionally, we seek comment on whether the incorporation of RTT into the provision of TRS operations should be mandated or only allowed.²⁹⁵ Along these lines, we seek comment on the appropriate regulatory treatment for RTT in the TRS context. Specifically, given that RTT is a text-based form of communication – as is TTY-based TRS and IP Relay, should this feature be subject to the same regulatory treatment that applies to TTY-based TRS, or would it be more appropriate to consider this akin to IP Relay for purposes of the Commission's TRS rules? For example, should we require RTT-based TRS providers to meet the same mandatory minimum standards as currently applied to TTY-based TRS,

²⁸⁹ Hamilton Reply Comments at 4-5, 10.

²⁹⁰ Consumer Groups Reply Comments at 2-3.

²⁹¹ RERCs and Omnitor Comments at 18-20.

²⁹² See *supra* section III.A.

²⁹³ See *supra* para. 9.

²⁹⁴ 47 U.S.C. § 225(d)(2).

²⁹⁵ At present, only TTY-based TRS and speech-to-speech relay services are mandated under the Commission's rules. While the costs of calls made over IP-based forms of TRS – namely VRS, IP CTS and IP Relay – can be compensated from the TRS Fund, these forms of TRS are not mandated. See 47 CFR §§ 64.603 (mandating TTY-based service and STS), 64.606(a)(2) (providing for certification of Internet-based TRS to receive compensation from the Interstate TRS Fund); *CTS Declaratory Ruling*, 18 FCC Rcd at 16121, para. 1 (recognizing CTS as a form of TRS eligible for compensation from the Interstate TRS Fund).

such as call release functionality?²⁹⁶ To what extent should such providers be required to handle emergency calls, and should they adhere to the Commission's rules for TTY-based TRS or IP Relay TRS for this purpose? Are there certain mandatory minimum standards that should not be applicable to RTT technology?

84. Given that TTY-based TRS is a mandated service for common carriers, if we require the provision of RTT-TRS, at what point in the future should providers be relieved of their obligations to provide and support TTY-based TRS? Should wireline IP-based voice service providers and equipment manufacturers be required to support RTT before TRS providers are required to support RTT?

85. At the same time that we recognize that RTT has the potential to improve TRS for certain RTT users who choose to communicate directly in text with another party, we agree with commenters that RTT should augment and complement, rather than supplant TRS,²⁹⁷ and seek comment on this belief. Specifically, we acknowledge that some forms of TRS, such as video relay service and speech-to-speech service, may fulfill the needs of people with disabilities who are not text-reliant users. In particular, VRS makes relay service functionally equivalent to conventional telephone service for individuals whose first language is American Sign Language.²⁹⁸ TRS is also needed in circumstances where the party at the other end of the call is communicating by voice and is not equipped to use other means of communication. We therefore believe that the addition of RTT as a TRS option should not diminish the ability of individuals who are reliant on these other forms of TRS to continue having access to those services. We seek comment on this assumption.

86. Finally, we seek input on the mechanisms that are needed to ensure that the provision of RTT-TRS by IP-based providers effectively meets the communication needs of TRS users. Should the Commission require TRS providers to support RTT to enable text-based communication between the CA and the text-reliant user; between the CA and the other party to the call; or between both parties to the call? Are there technical challenges associated with supporting RTT in situations where the parties to the call are connected through an IP-based TRS provider? Should we require IP CTS providers to support RTT transmission in any voice channels they provide and in any off-the-shelf equipment provided to IP CTS users? Would the use of conversation windows help an IP CTS user distinguish between a direct RTT communication received from the other party and text generated by an IP CTS relay operator? Are there technical standards we should adopt for the provision of RTT by IP-based TRS providers? We seek comment specifically on the costs, benefits, and feasibility of requiring IP-based TRS providers to incorporate RTT capability into the provision of their services and on other related matters. Finally, we seek comment on the appropriate timeline for adopting RTT requirements for IP-based TRS providers.

87. *Impact of RTT on TRS.* In the *NPRM*, we assumed that because RTT will provide greater opportunities for direct, point-to-point text communications and can enable text to be intermixed with voice, it can reduce reliance on relay services to the extent RTT capabilities in end user devices become ubiquitous as a universal text solution.²⁹⁹ We similarly noted that RTT could enhance the ability of TRS to provide functionally equivalent telephone service for those individuals who continue to rely on TRS as their communication method.³⁰⁰ AT&T agrees that it is important to review the potential impacts of RTT on TRS, and specifically to assess the need to adjust the TRS Fund supporting these services as this

²⁹⁶ See, e.g., 47 CFR 64.604(a)(vi)(A).

²⁹⁷ See *supra* note 288.

²⁹⁸ *Telecommunications Relay Services and Speech-to-Speech Services for Individuals with Hearing and Speech Disabilities*, Report and Order and Further Notice of Proposed Rulemaking, 15 FCC Rcd 5140, 5153, para. 23 (2000).

²⁹⁹ *NPRM*, 31 FCC Rcd at 6266, para. 35.

³⁰⁰ *Id.* at 6266, para. 36.

impact becomes clearer.³⁰¹ We seek comment on the best methodology to determine the extent to which RTT reduces reliance on TRS. Additionally, how can we best determine the extent to which the introduction of RTT increases TRS use among some consumers because it enhances the ability of TRS to provide functionally equivalent telephone service? Should any data collected on the effect that RTT has on TRS wait until wireline networks transition from TTY technology to RTT? What other information should the Commission consider in determining whether the availability and use of RTT necessitates changes to the TRS program or its funding?

C. Other RTT Features

88. *Compatibility with Refreshable Braille Displays.* In the *NPRM*, we sought comment on whether it is possible to identify certain RTT features or functional capabilities that are necessary to meet the communication needs of individuals who are deaf-blind, people with cognitive disabilities, or other specific segments of the disability community.³⁰² The RERCs and Omnitor suggest that slowing down an RTT text display is necessary for refreshable Braille displays.³⁰³ They also suggest enabling Braille display users to suspend incoming text when the user is typing, because receiving text while typing on a Braille keyboard could cause confusion.³⁰⁴ We seek comment on whether these and similar features can enhance service providers' and manufacturers' ability to meet Part 6, 7, and 14 performance objectives for individuals who use refreshable Braille displays, including people who are deaf-blind. We also seek further comment on the technical and practical challenges of supporting compatibility with refreshable Braille displays and similar assistive technologies. What current steps are being taken to examine these issues? Is there a potential timeline for resolving concerns to support the use of refreshable Braille displays with RTT?

89. *Block Mode.* In the *NPRM*, we stressed that RTT's character-by-character transmission mode is one of the characteristics that makes it the most effective replacement for TTY technology.³⁰⁵ However, we also inquired whether it would be desirable to make "block mode" available with RTT as an optional mode that could be selected by RTT users.³⁰⁶ Block mode allows the user to hold onto a text communication while it is being composed, and then send it in its entirety, in a manner akin to SMS or text messaging. This enables the user to edit individual characters and groups of words before sending a message. Some commenters agree that block mode is a desirable option that would enhance effective communication for certain individuals and in certain situations.³⁰⁷ For example, although the instantaneous nature of RTT is typically beneficial in emergency situations, NENA reports that there may be times when using block mode is preferable for a 911 operator who wishes to transmit instructions all at once, without concern that an individual will act on an incomplete transmission.³⁰⁸ The ability to send communications in a block mode also may be useful for consumers with mobility or cognitive

³⁰¹ See AT&T Dec. 1 Ex Parte Letter at 2.

³⁰² *NPRM*, 31 FCC Rcd at 6285, para. 82.

³⁰³ RERCs and Omnitor Comments at 59.

³⁰⁴ *Id.*

³⁰⁵ *NPRM*, 31 FCC Rcd at 6266-68, paras. 37-39.

³⁰⁶ *Id.* at 6281, para. 71.

³⁰⁷ See AT&T Comments at 9, n.9 (consumers should be able to adjust their RTT settings, including default settings, in the manner that suits their preferred method of communication); RERCs and Omnitor Comments at 51-52; West Safety Comments at 6.

³⁰⁸ NENA Reply Comments at 5; see also West Safety Comments at 6 (stating that PSAPS should have the discretion to provide complete instructions prior to transmittal to avoid possible misunderstandings).

disabilities.³⁰⁹ Finally, some commenters report that enabling block mode may address problems feature phone users have in conveying messages on a character-by-character basis.³¹⁰ We seek further comment on the extent to which offering a block mode option will enhance service providers' and manufacturers' ability to meet Part 6, 7, and 14 performance objectives for people with certain types of disabilities.

V. PROCEDURAL MATTERS

A. Regulatory Flexibility Act

90. *Final Regulatory Flexibility Analysis.* As required by the Regulatory Flexibility Act of 1980, as amended (RFA),³¹¹ the Commission has prepared a Final Regulatory Flexibility Analysis (FRFA) relating to this Report and Order. The FRFA is set forth in Appendix D.

91. *Initial Regulatory Flexibility Analysis.* As required by the RFA, the Commission has prepared an Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on small entities of the policies and rules addressed in this item. The IRFA is set forth in Appendix D. Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments on the FNPRM provided on or before the dates indicated. The Commission will send a copy of the FNPRM, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration.³¹² In addition, the FNPRM and IRFA (or summaries thereof) will be published in the Federal Registrar.³¹³

B. Paperwork Reduction Act Analysis

92. *Final Paperwork Reduction Act of 1995 Analysis.* The Report and Order adopts new information collection requirements subject to the Paperwork Reduction Act of 1995 (PRA).³¹⁴ The new information collection requirements will be submitted to the Office of Management and Budget (OMB) for review under section 3507(d) of the PRA.³¹⁵ OMB, the general public, and other Federal agencies are invited to comment on the new information collection requirements contained in this proceeding. In addition, we note that, pursuant to the Small Business Paperwork Relief Act of 2002,³¹⁶ the Commission previously sought comment on how the Commission might "further reduce the information collection burden for small business concerns with fewer than 25 employees."³¹⁷

93. The FNPRM seeks comment on proposed rule amendments that may result in new or modified information collection requirements. If the Commission adopts any new or modified information collection requirements, the Commission will publish another notice in the *Federal Register* inviting the public to comment on the requirements, as required by the PRA.³¹⁸ In addition, pursuant to

³⁰⁹ See TIA Comments at 10; CTIA Comments at 10; CTA Comments at 5-6; RERCs and Omnitor Comments at 51 (noting that some individuals may have tremors or other disabilities that require that they clean up text before sending it); see also *supra* note 104 (explaining the relevance of the performance objectives for people with vision, mobility and cognitive disabilities to RTT).

³¹⁰ See TIA Comments at 10; CTA Comments at 5-6.

³¹¹ 5 U.S.C. § 601 *et seq.*

³¹² *Id.* § 603(a).

³¹³ *Id.* § 603(a).

³¹⁴ Public Law 104-13, 109 Stat 163 (1995) (codified at 44 U.S.C. §§ 3501-3520).

³¹⁵ 44 U.S.C. § 3507(d).

³¹⁶ Pub. L. No. 107-198, 116 Stat. 729 (2002); see 44 U.S.C. § 3506(c)(4).

³¹⁷ *NPRM*, 31 FCC Rcd 6297, para. 118.

³¹⁸ 44 U.S.C. §§ 3501-3520.

the Small Business Paperwork Relief Act of 2002,³¹⁹ we seek specific comment on how we might further reduce the information collection burden for small business concerns with fewer than 25 employees.

C. Comment Filing Procedure

94. Pursuant to sections 1.415 and 1.419 of the Commission's rules,³²⁰ interested parties may file comments and reply comments regarding the FNPRM on or before the dates indicated on the first page of this document. All comments are to reference CG Docket No. 16-145 and GN Docket No. 15-178.

95. *Electronic Filers:* Comments may be filed electronically using the Internet by accessing the Commission's Electronic Comment Filing System (ECFS): <http://apps.fcc.gov/ecfs>.³²¹

96. *Paper Filers:* Parties who choose to file by paper must file an original and one copy of each filing. If more than one docket or rulemaking number appears in the caption of this proceeding, filers must submit two additional copies for each additional docket or rulemaking number.

97. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail. All filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

- All hand-delivered or messenger-delivered paper filings for the Commission's Secretary must be delivered to FCC Headquarters at 445 12th Street, SW, Room TW-A325, Washington, DC 20554. The filing hours are 8:00 a.m. to 7:00 p.m. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.
- Commercial overnight mail (other than U.S. Postal Service Express Mail and Priority Mail) must be sent to 9300 East Hampton Drive, Capitol Heights, MD 20743.
- U.S. Postal Service first-class, Express, and Priority mail must be addressed to 445 12th Street, SW, Washington DC 20554.

D. Ex Parte Presentations

98. This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's *ex parte* rules.³²² Persons making *ex parte* presentations must file a copy of any written presentation or a memorandum summarizing any oral presentation within two business days after the presentation (unless a different deadline applicable to the Sunshine period applies). Persons making oral *ex parte* presentations are reminded that memoranda summarizing the presentations must (1) list all persons attending or otherwise participating in the meeting at which the *ex parte* presentation was made, and (2) summarize all data presented and arguments made during the presentation. If the presentation consisted in whole or in part of the presentation of data or arguments already reflected in the presenter's written comments, memoranda or other filings in the proceeding, the presenter may provide citations to such data or arguments in his or her prior comments, memoranda, or other filings (specifying the relevant page and/or paragraph numbers where such data or arguments can be found) in lieu of summarizing them in the memorandum. Documents shown or given to Commission staff during *ex parte* meetings are deemed to be written *ex parte* presentations and must be filed consistent with rule 1.1206(b).³²³ In

³¹⁹ *Id.* § 3506(c)(4).

³²⁰ 47 CFR §§ 1.415, 1.419.

³²¹ *See Electronic Filing of Documents in Rulemaking Proceedings*, Report and Order, 13 FCC Rcd 11322 (1998).

³²² 47 CFR §§ 1.1200–1.1216.

³²³ *Id.* § 1.1206(b).

proceedings governed by rule 1.49(f)³²⁴ or for which the Commission has made available a method of electronic filing, written *ex parte* presentations and memoranda summarizing oral *ex parte* presentations, and all attachments thereto, must be filed through the electronic comment filing system available for that proceeding, and must be filed in their native format (e.g., .doc, .xml, .ppt, searchable .pdf). Participants in this proceeding should familiarize themselves with the Commission's *ex parte* rules.

E. Congressional Review Act

99. The Commission will send a copy of this Report and Order and Further Notice of Proposed Rulemaking to Congress and the Government Accountability Office pursuant to the Congressional Review Act.³²⁵

F. Accessible Formats

100. To request materials in accessible formats for people with disabilities (Braille, large print, electronic files, audio format), send an e-mail to fcc504@fcc.gov or call the Consumer and Governmental Affairs Bureau at 202-418-0530 (voice), (844) 432-2275 (videophone), or 202-418-0432 (TTY).

G. Further Information

101. For further information regarding the Report and Order and Further Notice of Proposed Rulemaking, contact Michael Scott, CGB, Disability Rights Office, (202) 418-1264, e-mail Michael.Scott@fcc.gov, Suzy Rosen Singleton, CGB, Disability Rights Office, (202) 510-9446, e-mail Suzanne.Singleton@fcc.gov, or Bob Aldrich, CGB, (202) 418-0996, Robert.Aldrich@fcc.gov.

H. Incorporation by Reference

102. The Office of Federal Register (OFR) recently revised its regulations to require that agencies must discuss in the preamble of a proposed rule ways that the materials the agency proposes to incorporate by reference are reasonably available to interested parties or how it worked to make those materials reasonably available to interested parties. In addition, the preamble of the proposed rule must summarize the material.

103. The Internet Engineering Task Force (IETF) Request for Comments (RFC) 4103, Real-time Transport Protocol Payload for Text Conversation (2005) provides technical specifications for carrying real-time text conversation session contents in RTP packets on Internet Protocol-based communications networks. This document is available for download at the Internet Engineering Task Force website at <http://ietf.org> or directly at <https://www.ietf.org/rfc/rfc4103.txt>, and is available for inspection at the Federal Communications Commission, 445 12th St., S.W., Reference Information Center, Room CY-A257, Washington, DC 20554, (202) 418-0270.

VI. ORDERING CLAUSES

104. Accordingly, IT IS ORDERED, that pursuant to sections 4(i), 225, 255, 301, 303(r), 316, 403, 715, and 716 of the Communications Act of 1934, as amended, and section 106 of the CVAA, 47 U.S.C. §§ 154(i), 225, 255, 301, 303(r), 316, 403, 615c, 616, 617, this Report and Order and Further Notice of Proposed Rulemaking IS ADOPTED and the Commission's rules ARE HEREBY AMENDED as set forth in Appendix B.

105. IT IS FURTHER ORDERED that this Report and Order SHALL BE EFFECTIVE 30 days after publication of a summary in the *Federal Register*, except as otherwise specified.

106. IT IS FURTHER ORDERED that any such rule amendments that contain new or modified information collection requirements SHALL BE EFFECTIVE on the date specified in a notice

³²⁴ *Id.* § 1.49(f).

³²⁵ *See* 5 U.S.C. § 801(a)(1)(A).

published in the *Federal Register* announcing Office of Management and Budget approval of the information collection requirements of such rules pursuant to the Paperwork Reduction Act.

107. IT IS FURTHER ORDERED that the Commission SHALL SEND a copy of this Report and Order and Further Notice of Proposed Rulemaking in a report to be sent to Congress and the Government Accountability Office pursuant to the Congressional Review Act, 5 U.S.C. § 801(a)(1)(A).

108. IT IS FURTHER ORDERED that the Commission's Consumer and Governmental Affairs Bureau, Reference Information Center, SHALL SEND a copy of this Report and Order and Notice of Proposed Rulemaking, including the Final Regulatory Flexibility Analysis and the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

APPENDIX A**List of Commenting Parties****Comments**

Alliance for Telecommunications Industry Solutions (ATIS)
American Cable Association (ACA)
Association of Public-Safety Communications Officials-International, Inc. (APCO)
AT&T Services, Inc. (AT&T)
Boulder Regional Emergency Telephone Service Authority (BRETSA)
Competitive Carriers Association (CCA)
Consumer Technology Association (CTA)
CTIA
Disability and Communication Access Board, State of Hawaii (DCAB)
Hamilton Relay, Inc. (Hamilton)
Jordan Frentress
National Association of State 911 Administrators (NASNA)
National Cable & Telecommunications Association (NCTA)
NENA: The 911 Association (NENA)
New Mexico Commission for Deaf and Hard of Hearing Persons (NMCDHH)
Rehabilitation Engineering Research Center on Technology for the Deaf and Hard of Hearing, the
Rehabilitation Engineer Research Center on Universal Interface and IT Access, and Omnitor (RERCs and
Omnitor)
Sorenson Communications, Inc. and its affiliate CaptionCall, LLC (Sorenson)
Telecommunications for the Deaf and Hard of Hearing, Inc., Association of Late-Deafened Adults, Inc.,
Cerebral Palsy and Deaf Organization, Hearing Loss Association of America, and National Association of
the Deaf (Consumer Groups)
Telecommunications Industry Association (TIA)
The Texas 9-1-1 Alliance, the Texas Commission on State Emergency Communications, and the
Municipal Emergency Communication Districts Association (Texas 9-1-1 Entities)
T-Mobile USA, Inc. (T-Mobile)
TracFone Wireless, Inc. (TracFone)
Verizon
VTCSecure LLC (VTCSecure)
West Safety Services, Inc. (West Safety)

Reply Comments

AT&T
CCA
Consumer Groups
CSDVRS, LLC. d/b/a ZVRS (ZVRS)
CTIA
Hamilton
Microsoft Corporation (Microsoft)
NENA
RERCs and Omnitor
Rural Wireless Association, Inc. (RWA)
Sorenson
T-Mobile
The Voice on the Net Coalition (VON)

APPENDIX B

Final Rules

PART 6—ACCESS TO TELECOMMUNICATIONS SERVICE, TELECOMMUNICATIONS EQUIPMENT AND CUSTOMER PREMISES EQUIPMENT BY PERSONS WITH DISABILITIES

1. Revise the authority citation for part 6 to read as follows:

Authority: 47 U.S.C. 151–154, 208, 255, and 303(r).

2. Amend § 6.3 by:

a. Adding new paragraphs (a)(3), (b)(5), (m), and (n).

The additions and revisions read as follows:

§ 6.3 Definitions.

(a) The term *accessible* shall mean that:

* * * * *

(3) *Real-Time Text*. Voice communication services subject to this part that are provided over wireless IP facilities and handsets and other text-capable end user devices used with such service that do not themselves provide TTY functionality, may provide TTY connectability and signal compatibility pursuant to paragraphs (b)(3) and (4), or support real-time text communications, in accordance with 47 CFR part 67.

(b) * * *

* * * * *

(5) *TTY Support Exemption*. Voice communication services subject to this part that are provided over wireless IP facilities and equipment used with such services are not required to provide TTY connectability and TTY signal compatibility if such services and equipment support real-time text, in accordance with 47 CFR part 67.

* * *(m) The term *real-time text* shall have the meaning set forth in section 67.1 of this chapter.

(n) The term *text-capable end user device* means customer premises equipment that is able to send, receive, and display text.

PART 7—ACCESS TO VOICEMAIL AND INTERACTIVE MENU SERVICES AND EQUIPMENT BY PEOPLE WITH DISABILITIES

1. Revise the authority citation for part 7 to read as follows:

Authority: 47 U.S.C. 151-154, 208, 255, and 303(r).

2. Amend § 7.3 by adding new paragraphs (a)(3), (b)(5), (n), and (o).

The additions and revisions read as follows:

§ 7.3 Definitions.

(a) The term *accessible* shall mean that:

* * * * *

(3) *Real-Time Text*. Voice communication services subject to this part that are provided over wireless IP facilities and handsets and other text-capable end user devices used with such service that do not themselves provide TTY functionality, may provide TTY connectability and signal compatibility pursuant to paragraphs (b)(3) and (4), or support real-time text communications, in accordance with 47 CFR part 67.

(b) * * *

* * * * *

(5) *TTY Support Exemption*. Voice communication services subject to this part that are offered over wireless IP facilities and equipment used with such services are not required to provide TTY connectability and TTY signal compatibility if such services and equipment support real-time text, in accordance with 47 CFR part 67.

* * *(n) The term *real-time text* shall have the meaning set forth in section 67.1 of this chapter.

(o) The term *text-capable end user device* means customer premises equipment that is able to send, receive, and display text.

PART 14—ACCESS TO ADVANCED COMMUNICATIONS SERVICES AND EQUIPMENT BY PEOPLE WITH DISABILITIES

1. The authority citation for part 14 continues to read as follows:

Authority: 47 U.S.C. 151–154, 255, 303, 403, 503, 617, 618, 619 unless otherwise noted.

2. Amend § 14.10 by adding new paragraphs (w) and (x) to read as follows:

§ 14.10 Definitions.

* * * * *

(w) The term *real-time text* shall have the meaning set forth in § 67.1 of this chapter.

(x) The term *text-capable end user device* means end user equipment that is able to send, receive, and display text.

3. Amend § 14.21 by adding new paragraphs (b)(3) and (d)(5).

The additions and revisions read as follows:

§ 14.21 Performance Objectives.

* * * * *

(b) *Accessible*. The term *accessible* shall mean that:

* * * * *

(3) *Real-Time Text*. Wireless interconnected VoIP services subject to this part and text-capable end user devices used with such services that do not themselves provide TTY functionality, may provide TTY connectability and signal compatibility pursuant to paragraphs (d)(3) and (4), or support real-time text communications, in accordance with 47 CFR part 67.

* * * * *

(d) * * *

* * * * *

(5) *TTY Support Exemption.* Interconnected and non-interconnected VoIP services subject to this part that are provided over wireless IP facilities and equipment are not required to provide TTY connectability and TTY signal compatibility if such services and equipment support real-time text, in accordance with 47 CFR part 67.

PART 20—COMMERCIAL MOBILE SERVICES

1. The authority citation for part 20 continues to read as follows:

Authority: 47 U.S.C. 151, 152(a), 154(i), 157, 160, 201, 214, 222, 251(e), 301, 302, 303, 303(b), 303(r), 307, 307(a), 309, 309(j)(3), 316, 316(a), 332, 615, 615a, 615b, 615c.

2. Amend § 20.18 by revising paragraph (c) to read as follows:

§ 20.18 911 Service.

* * * * *

(c) *Access to 911 services.*

1) CMRS providers subject to this section must be capable of transmitting 911 calls from individuals with speech or hearing disabilities through means other than mobile radio handsets, e.g., through the use of Text Telephone Devices (TTY). CMRS providers that provide voice communications over IP facilities are not required to support 911 access via TTYs if they provide 911 access via real-time text (RTT) communications, in accordance with 47 CFR Part 67, except that RTT support is not required to the extent that it is not achievable for a particular manufacturer to support RTT on the provider's network.

PART 64—MISCELLANEOUS RULES RELATING TO COMMON CARRIERS

1. Revise the authority citation for part 64 to read as follows:

Authority: 47 U.S.C. 154, 225, 403(b)(2)(B), (c), 715, Pub. L. 104-104, 110 Stat. 56. Interpret or apply 47 U.S.C. 201, 218, 222, 225, 226, 227, 228, 254(k), 616, 620, and the Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. 112-96, unless otherwise noted.

2. Amend § 64.601 by:

- a. revising paragraph (a)(15); and
- b. adding a new paragraph (a)(46).

The revisions and additions read as follows:

§ 64.601 Definitions and provisions of general applicability.

* * * * *

(a) * * *

* * * * *

(15) *Internet-based TRS (iTRS)*. A telecommunications relay service (TRS) in which an individual with a hearing or a speech disability connects to a TRS communications assistant using an Internet Protocol-enabled device via the Internet, rather than the public switched telephone network. Except as authorized or required by the Commission, Internet-based TRS does not include the use of a text telephone (TTY) or RTT over an interconnected voice over Internet Protocol service.

* * * * *

(46) *Real-Time Text (RTT)*. The term *real-time text* shall have the meaning set forth in § 67.1 of this chapter.

3. Amend § 64.603 to read as follows:

§ 64.603 Provision of services.

Each common carrier providing telephone voice transmission services shall provide, in compliance with the regulations prescribed herein, throughout the area in which it offers services, telecommunications relay services, individually, through designees, through a competitively selected vendor, or in concert with other carriers. Interstate Spanish language relay service shall be provided. Speech-to-speech relay service also shall be provided, except that speech-to-speech relay service need not be provided by IP Relay providers, VRS providers, captioned telephone relay service providers, and IP CTS providers. In addition, each common carrier providing telephone voice transmission services shall provide access via the 711 dialing code to all relay services as a toll free call. CMRS providers subject to this 711 access requirement are not required to provide 711 dialing code access to TTY users if they provide 711 dialing code access via real-time text communications, in accordance with 47 CFR part 67. A common carrier shall be considered to be in compliance with this section:

(a) * * *

PART 67 – REAL-TIME TEXT

1. Add a new Part 67 to read as follows:

Authority: 47 U.S.C. 151-154, 225, 251, 255, 301, 303, 307, 309, 316, 615c, 616, 617.

§ 67.1 Definitions.

- (a) “Authorized end user device” means a handset or other end user device that is authorized by the provider of a covered service for use with that service and is able to send, receive, and display text.
- (b) “CMRS provider” shall mean a CMRS provider as defined in § 20.18(c) of this chapter.
- (c) “Covered service” means a service that meets accessibility requirements by supporting RTT pursuant to Part 6, 7, 14, 20, or 64 of the Commission’s rules.
- (d) “RFC 4103” means standard Internet Engineering Task Force (IETF) Request for Comments (RFC) 4103, Real-time Transport Protocol Payload for Text Conversation (2005) (incorporated by reference, see § 67.3 of this part).
- (e) “RFC 4103-conforming” service or user device means a covered service or authorized end user device that enables initiation, sending, transmission, reception, and display of RTT communications in conformity with RFC 4103.
- (f) “RFC 4103-TTY gateway” means a gateway that is able to reliably and accurately transcode communications between (1) RFC 4103-conforming services and devices and (2) circuit-switched networks that support communications between TTYs.

(g) “Real-time text (RTT)” or “RTT communications” means text communications that are transmitted over Internet Protocol (IP) networks immediately as they are created, *e.g.*, on a character-by-character basis.

(h) “Support RTT” or “support RTT communications” means to enable users to initiate, send, transmit, receive, and display RTT communications in accordance with the applicable provisions of this part.

§ 67.2 Minimum Functionalities of RTT.

(a) *RTT-RTT Interoperability.* Covered services and authorized end user devices shall be interoperable with other services and devices that support RTT in accordance with this part. A service or authorized end user device shall be deemed to comply with this paragraph (a) if:

(1) It is an RFC-4103-conforming end user device;

(2) RTT communications between such service or end user device and an RFC 4103-conforming service or end user device are reliably and accurately transcoded –

(i) to and from RFC 4103, or

(ii) to and from an internetworking protocol mutually agreed-upon with the owner of the network serving the RFC 4103-conforming service or device.

(b) *RTT-TTY Interoperability.* Covered services and authorized end user devices shall be interoperable with TTYs connected to other networks. Covered services and authorized end user devices shall be deemed to comply with this paragraph (b) if communications to and from such TTYs:

(1) pass through an RFC 4103-TTY gateway, or

(2) are reliably and accurately transcoded to and from an internetworking protocol mutually agreed-upon with the owner of the network serving the TTY.

(c) *Features and Capabilities.* Covered services and authorized end user devices shall enable the user to:

(1) initiate and receive RTT calls to and from the same telephone numbers for which voice calls can be initiated and received;

(2) transmit and receive RTT communications to and from any 911 public safety answering point (PSAP) in the United States; and

(3) send and receive text and voice simultaneously in both directions on the same call using a single device.

§ 67.3 Incorporation by Reference

The Internet Engineering Task Force (IETF) Request for Comments (RFC) 4103, Real-time Transport Protocol Payload for Text Conversation (2005) is incorporated by reference in this part. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. This document is available for download at the Internet Engineering Task Force website at <http://ietf.org> or directly at <https://www.ietf.org/rfc/rfc4103.txt>, and is available for inspection at the Federal Communications Commission, 445 12th St., S.W., Reference Information Center, Room CY-A257, Washington, DC 20554, (202) 418-0270.

APPENDIX C

Final Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act of 1980, as amended (RFA),¹ the Commission incorporated an Initial Regulatory Flexibility Analyses (IRFA) into the *Notice of Proposed Rulemaking (Notice)*.² The Commission sought written public comment on the proposals in the *Notice*, including comment on the IRFA. No comments were received on the IRFA. This Final Regulatory Flexibility Analysis (FRFA) conforms to the RFA.³ The Report and Order and FRFA (or summaries thereof) will be published in the Federal Register.⁴

A. Need for, and Objectives of, the Report and Order

2. In the Report and Order, the Commission takes specific steps to amend its rules to facilitate a transition from outdated text telephony (TTY) technology to a reliable and interoperable means of providing real-time text (RTT) communication over Internet Protocol (IP) enabled networks and services for people who are deaf, hard of hearing, speech disabled, and deaf-blind. Real-time text is a mode of communication that permits text to be sent immediately as it is being created. In response to various proposals made in the *Notice* adopted earlier this year, the Commission adopts rules to:

- Permit commercial mobile radio service (CMRS) providers to support RTT in lieu of TTY technology for communications using wireless IP-based voice services;
- Allow providers of telecommunications and interconnected VoIP services provided over wireless IP facilities and manufacturers of equipment used with such services to support RTT in lieu of supporting TTY technology, “if readily achievable” or “unless not achievable”;
- Relieve wireless service providers and equipment manufacturers of all TTY support obligations to the extent they support RTT on IP facilities in accordance with Commission rules;
- Establish the following criteria defining what constitutes support for RTT:
 - RTT communications must be interoperable across networks and devices, and this may be achieved through adherence to RFC 4103, as a “safe harbor” standard for RTT;
 - RTT communications must be backward compatible with TTY technology;
 - RTT must support 911 communications and 711 relay communications; and
- Establish that support for RTT includes support for the ability to initiate and receive calls with the same telephone numbers as are used for voice communications and simultaneous voice and text in the same call session;

¹ See 5 U.S.C. § 603. The RFA, see 5 U.S.C. §§ 601-612, was amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 847 (1996). The SBREFA was enacted as Title II of the Contract with America Advancement Act of 1996 (CWAAA).

² *Transition from TTY to Real-Time Text Technology; Petition for Rulemaking to Update the Commission’s Rules for Access to Support the Transition from TTY to Real-Time Text Technology and Petition for Waiver of Rules Requiring Support of TTY Technology*, Notice of Proposed Rulemaking, 31 FCC Rcd 6247 (2016).

³ See 5 U.S.C. § 604.

⁴ See *Id.* § 604(b).

- Recognize that the provision of accessible indicators for call answering and activity, appropriate latency and error rates, and pre-installed and default functionality on devices can facilitate making RTT service functionally equivalent to voice communications;
- Permit manufacturers and service providers, to the extent the latter are responsible for the accessibility of end user devices activated on their IP-based wireless voice communications networks, to ensure that devices that have the ability to send, receive, and display text include RTT capability in lieu of supporting TTY technology, subject to the readily achievable and achievable limitations for Parts 6, 7, and 14, as applicable;
- Find that RTT is an “electronic messaging service” that is subject to the performance objectives of Parts 6, 7, and 14 of the Commission’s rules, if readily achievable or unless not achievable, as applicable.
- Establish the following timelines for implementation of RTT:
 - By December 31, 2017, each Tier I CMRS provider and, by June 30, 2020, each non-Tier I provider choosing to support RTT in lieu of TTY over IP facilities shall support RTT either (1) through a downloadable RTT application or plug-in that supports RTT; or (2) by implementing native RTT functionality into its core network, offering at least one handset model that supports RTT, and including the requirement to support RTT in future design specifications for all authorized user devices specified on or after these dates;
 - By December 31, 2018, manufacturers that provide devices for CMRS providers’ IP-based voice services and that choose to support RTT in lieu of TTY technology shall implement RTT in newly manufactured equipment, if readily achievable or unless not achievable, as applicable.
 - By December 31, 2019, each Tier I CMRS provider and, by June 30, 2021, each non-Tier I CMRS provider choosing to support RTT in lieu of TTY over IP facilities shall support RTT for all new authorized user devices;
 - A carrier is subject to the above timelines except to the extent that it is not achievable for a particular manufacturer to support RTT on that carrier’s network, in which case a carrier may rely in good faith on a manufacturer’s representations in this regard; and
- Establish consumer outreach, education, and notice guidelines to inform the public about the transition from TTY Technology to RTT, including how this technology will work.

B. Summary of Significant Issues Raised by Public Comments in Response to the IRFA.

3. No comments were filed in response to the IRFA.

C. Description and Estimate of the Number of Small Entities Impacted

4. The RFA directs agencies to provide a description and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.⁵ The RFA generally defines the term “small entity” as having the same meaning as the terms “small business,” “small organization,” and “small governmental jurisdiction.”⁶ In addition, the term “small business” has the

⁵ See *Id.* § 603(b)(3).

⁶ *Id.* § 601(6).

same meaning as the term “small-business concern” under the Small Business Act.⁷ A “small-business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.⁸

5. The majority of the rules adopted in the *Report and Order* will affect obligations on telecommunications carriers and providers, VoIP service providers, wireline and wireless service providers, advanced communications services (ACS) providers, and telecommunications equipment and software manufacturers. Other entities, however, that choose to object to the substitution of RTT for TTY technology under the Commission’s amended rules may be economically impacted by the Report and Order.

6. A small business is an independent business having less than 500 employees. Nationwide, there are approximately 28.8 million small businesses, according to the SBA.⁹ Affected small entities as defined by industry are as follows.

1. Wireline Providers

7. *Wired Telecommunications Carriers.* The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”¹⁰ The SBA has developed a small business size standard for Wired Telecommunications Carriers, which consists of all such companies having 1,500 or fewer employees.¹¹ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.¹² Thus, under this size standard, the majority of firms in this industry can be considered small.

8. *Local Exchange Carriers (LECs).* Neither the Commission nor the SBA has developed a size standard for small businesses specifically applicable to local exchange services. The closest applicable size standard under SBA rules is for Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.¹³ The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single

⁷ See *Id.* § 601(3) (incorporating by reference the definition of “small-business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

⁸ See 15 U.S.C. § 632(l).

⁹ See SBA, Office of Advocacy, *Frequently Asked Questions* (June 2016), https://www.sba.gov/sites/default/files/advocacy/SB-FAQ-2016_WEB.pdf.

¹⁰ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

¹¹ See 13 CFR § 120.201, NAICS Code 517110.

¹² http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

¹³ 13 CFR § 121.201; NAICS code 517110.

technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”¹⁴ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.¹⁵ According to Commission data, 1,307 carriers reported that they were incumbent local exchange service providers.¹⁶ Of these 1,307 carriers, an estimated 1,006 have 1,500 or fewer employees and 301 have more than 1,500 employees.¹⁷ Consequently, the Commission estimates that most providers of local exchange service are small entities.

9. *Incumbent Local Exchange Carriers (Incumbent LECs)*. Neither the Commission nor the SBA has developed a small business size standard specifically for incumbent local exchange services. The closest applicable size standard under SBA rules is for the category Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.¹⁸ The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”¹⁹ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.²⁰ According to Commission data,²¹ 1,307 carriers reported that they were incumbent local exchange service providers.²² Of these 1,307 carriers, an estimated 1,006 have 1,500 or fewer employees and 301 have more than 1,500 employees.²³ Consequently, the Commission estimates that most providers of incumbent local exchange service are small entities.

10. We have included small incumbent LECs in this present RFA analysis. As noted above, a “small business” under the RFA is one that, *inter alia*, meets the pertinent small business size standard (e.g., a telephone communications business having 1,500 or fewer employees), and “is not dominant in its

¹⁴ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

¹⁵ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

¹⁶ Federal Communications Commission, Wireline Competition Bureau, Industry Analysis and Technology Division, *Trends in Telephone Service*, tbl. 5.3 (Sept. 2010), https://apps.fcc.gov/edocs_public/attachmatch/DOC-301823A1.pdf (*Trends in Telephone Service*).

¹⁷ *See id.*

¹⁸ 13 CFR § 121.201; NAICS code 517110.

¹⁹ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

²⁰ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

²¹ *See Trends in Telephone Service* at tbl. 5.3.

²² *See id.*

²³ *See id.*

field of operation.”²⁴ The SBA’s Office of Advocacy contends that, for RFA purposes, small incumbent LECs are not dominant in their field of operation because any such dominance is not “national” in scope.²⁵ We have therefore included small incumbent LECs in this RFA analysis, although we emphasize that this RFA action has no effect on Commission analyses and determinations in other, non-RFA contexts.

11. *Competitive Local Exchange Carriers (Competitive LECs), Competitive Access Providers (CAPs), Shared-Tenant Service Providers, and Other Local Service Providers.* Neither the Commission nor the SBA has developed a small business size standard specifically for these service providers. The appropriate size standard under SBA rules is for the category Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.²⁶ The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”²⁷ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.²⁸ According to Commission data, 1,442 carriers reported that they were engaged in the provision of either competitive local exchange services or competitive access provider services.²⁹ Of these 1,442 carriers, an estimated 1,256 have 1,500 or fewer employees and 186 have more than 1,500 employees.³⁰ In addition, 17 carriers have reported that they are Shared-Tenant Service Providers, and all 17 are estimated to have 1,500 or fewer employees.³¹ In addition, 72 carriers have reported that they are Other Local Service Providers.³² Of the 72, seventy have 1,500 or fewer employees and two have more than 1,500 employees.³³ Consequently, the Commission estimates that most providers of competitive local exchange service, competitive access providers, Shared-Tenant Service Providers, and other local service providers are small entities.

12. *Interexchange Carriers.* Neither the Commission nor the SBA has developed a small business size standard specifically for providers of interexchange services. The appropriate size standard under SBA rules is for the category Wired Telecommunications Carriers. Under that size standard, such a

²⁴ 5 U.S.C. § 601(3).

²⁵ Letter from Jere W. Glover, Chief Counsel for Advocacy, SBA, to William E. Kennard, Chairman, Federal Communications Commission (filed May 27, 1999). The Small Business Act contains a definition of “small business concern,” which the RFA incorporates into its own definition of “small business.” 15 U.S.C. § 632(a); 5 U.S.C. § 601(3). SBA regulations interpret “small business concern” to include the concept of dominance on a national basis. 13 CFR § 121.102(b).

²⁶ 13 CFR § 121.201; NAICS code 517110.

²⁷ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

²⁸ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

²⁹ See *Trends in Telephone Service* at tbl. 5.3.

³⁰ See *id.*

³¹ See *id.*

³² See *id.*

³³ See *id.*

business is small if it has 1,500 or fewer employees.³⁴ The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”³⁵ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.³⁶ According to Commission data, 359 carriers have reported that they are engaged in the provision of interexchange service.³⁷ Of these, an estimated 317 have 1,500 or fewer employees and 42 have more than 1,500 employees.³⁸ Consequently, the Commission estimates that the majority of interexchange carriers are small entities.

13. *Other Toll Carriers.* Neither the Commission nor the SBA has developed a size standard for small businesses specifically applicable to Other Toll Carriers. This category includes toll carriers that do not fall within the categories of interexchange carriers, operator service providers, prepaid calling card providers, satellite service carriers, or toll resellers. The closest applicable size standard under SBA rules is for Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.³⁹ According to Commission data, 284 companies reported that their primary telecommunications service activity was the provision of other toll carriage.⁴⁰ Of these, an estimated 279 have 1,500 or fewer employees and five have more than 1,500 employees.⁴¹ Consequently, the Commission estimates that most Other Toll Carriers are small entities.

2. Wireless Providers

14. *Wireless Telecommunications Carriers (except Satellite).* Since 2007, the Census Bureau has placed wireless firms within this new, broad, economic census category.⁴² The Census Bureau defines this industry as comprising “establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular phone services, paging services, wireless Internet access, and wireless video services.”⁴³ Under the present and prior categories,

³⁴ 13 CFR § 121.201; NAICS code 517110.

³⁵ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

³⁶ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

³⁷ *Trends in Telephone Service* at tbl. 5.3.

³⁸ *See id.*

³⁹ *See* 13 CFR § 121.201; NAICS code 517110.

⁴⁰ *See Trends in Telephone Service* at tbl. 5.3.

⁴¹ *See id.*

⁴² U.S. Census Bureau, 2012 NAICS Definitions, 517210 Wireless Telecommunications Categories (Except Satellite), <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517210&search=2012%20NAICS%20Search> (last visited Apr. 28, 2016).

⁴³ U.S. Census Bureau, 2007 NAICS Definitions, 517210 Wireless Telecommunications Carriers (Except Satellite), <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517210&search=2007%20NAICS%20Search> (last visited Apr. 28, 2016).

the SBA has deemed a wireless business to be small if it has 1,500 or fewer employees.⁴⁴ For the category of Wireless Telecommunications Carriers (except Satellite), census data for 2012 show that there were 967 firms that operated for the entire year. Of this total, 955 firms had fewer than 1,000 employees.⁴⁵ Since all firms with fewer than 1,500 employees are considered small, given the total employment in the sector, we estimate that the vast majority of wireless firms are small entities.

3. Cable Service Providers

15. Cable Companies and Systems (Rate Regulation). The Commission has developed its own small business size standards for the purpose of cable rate regulation. Under the Commission's rules, a "small cable company" is one serving 400,000 or fewer subscribers nationwide.⁴⁶ Industry data indicate that there are currently 4,600 active cable systems in the United States.⁴⁷ Of this total, all but nine cable operators nationwide are small under the 400,000-subscriber size standard.⁴⁸ In addition, under the Commission's rate regulation rules, a "small system" is a cable system serving 15,000 or fewer subscribers.⁴⁹ Current Commission records show 4,600 cable systems nationwide.⁵⁰ Of this total, 3,900 cable systems have fewer than 15,000 subscribers, and 700 systems have 15,000 or more subscribers.⁵¹ Thus, under this standard, we estimate that most cable systems are small entities.

4. All Other Telecommunications

16. *All Other Telecommunications*. The Census Bureau defines this industry as including "establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems. Establishments providing Internet services or Voice over Internet Protocol (VoIP) services via client-supplied telecommunications connections are also included in this industry."⁵² The SBA has developed a small business size standard for this category; that size standard is \$32.5 million or less in average annual receipts.⁵³ For this category, census data for 2012, there were 1,442 firms that operated for the entire year. Of these firms, a total of 1,400 had gross annual

⁴⁴ 13 CFR § 121.201; NAICS code 517210 (2012 NAICS). The now-superseded, pre-2007 CFR citations were 13 CFR § 121.201, NAICS codes 517211 and 517212 (referring to the 2002 NAICS).

⁴⁵ U.S. Census Bureau, Subject Series: Information, Table 5, "Establishment and Firm Size: Employment Size of Firms for the United States: 2012 NAICS Code 517210," http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ5&prodType=table.

⁴⁶ 47 CFR § 76.901(e).

⁴⁷ Data contained in the Commission's Cable Operations and Licensing System (COALS), August 15, 2015 (COALS Data). See <https://apps.fcc.gov/coals/>.

⁴⁸ See SNL KAGAN at <https://snl.cominteractive/XtopcableMSOs.aspx?period2015Q1&sortcol=subscribersbasic&sortorder=desc>.

⁴⁹ 47 CFR § 76.901(c).

⁵⁰ COALS Data.

⁵¹ *Id.*

⁵² U.S. Census Bureau, 2012 NAICS Definitions, 517919 All Other Telecommunications, <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?>

⁵³ See 13 CFR § 121.201; NAICS code 517919.

receipts of under \$25 million.⁵⁴ Consequently, we estimate that the majority of these firms are small entities.

17. *TRS Providers.* TRS providers are generally classified within the broad category of “All Other Telecommunications.” Seven providers currently receive compensation from the Interstate Telecommunications Relay Service (TRS) Fund for providing TRS: ASL Services Holdings, LLC; CSDVRS, LLC; Convo Communications, LLC; Hamilton Relay, Inc.; Purple Communications, Inc.; Sprint Communications, Inc. (Sprint); and Sorenson Communications, Inc. Six of the authorized TRS providers can be included within the broad economic census category of All Other Telecommunications.⁵⁵ The SBA has developed a small business size standard for All Other Telecommunications, which consists of all such firms with gross annual receipts of \$32.5 million or less.⁵⁶ For this category, census data for 2012 show that there were 1,442 firms that operated for the entire year. Of these firms, a total of 1,400 had gross annual receipts of less than \$25 million.⁵⁷ Under this category and the associated small business size standard, approximately half of the TRS providers can be considered small.

5. Equipment Manufacturers

a. Manufacturers of Equipment to Provide VoIP

18. Entities manufacturing equipment used to provide interconnected Voice over Internet Protocol (VoIP), non-interconnected VoIP, or both are generally found in one of two Census Bureau categories, “Electronic Computer Manufacturing”⁵⁸ or “Telephone Apparatus Manufacturing.”⁵⁹ While the Commission recognizes that the manufacturers of equipment used to provide interconnected VoIP will continue to be regulated under section 255 rather than under section 716,⁶⁰ we include here an analysis of the possible significant economic impact of our proposed rules on manufacturers of equipment used to provide both interconnected and non-interconnected VoIP. However, in the absence of more accurate data, we present these figures to provide as thorough an analysis of the impact on small entities as we can at this time.

19. *Electronic Computer Manufacturing.* The Census Bureau defines this category to include “. . . establishments primarily engaged in manufacturing and/or assembling electronic computers, such as mainframes, personal computers, workstations, laptops, and computer servers. Computers can be analog, digital, or hybrid. Digital computers, the most common type, are devices that do all of the following: (1)

⁵⁴ U.S. Census Bureau, 2012 Economic Census, Information: Subject Series – Establishment and Firm Size: Table 4, “Receipts Size of Firms for the United States: 2012, NAICS Code 517919,” http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ4&prodT ype=table.

⁵⁵ Because Sprint’s primary business is wireless telecommunications, it fits within the definition of Wireless Telecommunications Carriers (except Satellite). As a result, Sprint is not considered to be within the category of All Other Telecommunications.

⁵⁶ See 13 CFR § 121.201; NAICS Code 517919.

⁵⁷

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ4&prodT ype=table.

⁵⁸ U.S. Census Bureau, 2007 NAICS Definitions, “334111 Electronic Computer Manufacturing”; <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334111&search=2007%20NAICS%20Search>.

⁵⁹ U.S. Census Bureau, 2007 NAICS Definitions, “334210 Telephone Apparatus Manufacturing”; <http://www.census.gov/naics/2007/def/nd334210.htm>.

⁶⁰ See 47 U.S.C. § 617(f) (stating that the requirements of section 716 shall not apply to any equipment or services, including interconnected VoIP service, subject to section 255 as of the date of enactment of section 716 and such equipment and services shall instead remain subject to the requirements of section 255); see also 47 CFR § 14.2(c).

store the processing program or programs and the data immediately necessary for the execution of the program; (2) can be freely programmed in accordance with the requirements of the user; (3) perform arithmetical computations specified by the user; and (4) execute, without human intervention, a processing program that requires the computer to modify its execution by logical decision during the processing run. Analog computers are capable of simulating mathematical models and contain at least analog, control, and processing elements. The manufacture of computers includes the assembly of or integration of processors, co-processors, memory, storage, and input/output devices into a user-programmable final product. The manufacture of computers includes the assembly or integration of processors, coprocessors, memory, storage, and input/output devices into a user-programmable final product.”⁶¹ In this category, the SBA has deemed an electronic computer manufacturing business to be small if it has fewer than 1,000 employees.⁶² Census data for 2007 indicate that 366 establishments in this category operated throughout that year. Of that number, 362 operated with less 1,000 employees.⁶³ Consequently, we estimate that the majority of these establishments are small entities.

20. *Telephone Apparatus Manufacturing (wireline)*. The Census Bureau defines this category to comprise “establishments primarily engaged in manufacturing wire telephone and data communications equipment.”⁶⁴ The Census Bureau further states: “These products may be standalone or board-level components of a larger system. Examples of products made by these establishments are central office switching equipment, cordless telephones (except cellular), PBX equipment, telephones, telephone answering machines, LAN modems, multi-user modems, and other data communications equipment, such as bridges, routers, and gateways.”⁶⁵ In this category the SBA deems a telephone apparatus manufacturing business to be small if it has 1,000 or fewer employees.⁶⁶ For this category of manufacturers, Census data for 2012 showed that there were 266 such establishments that operated for that entire year.⁶⁷ Of those, 262 had fewer than 1,000 employees.⁶⁸ Thus, under this size standard, the majority of establishments in this industry can be considered small. On this basis, the Commission continues to estimate that approximately 99% or more of the manufacturers of equipment used to provide VoIP in this category are small entities.

21. *Computer Terminal and Other Computer Peripheral Equipment Manufacturing*. This U.S. industry comprises establishments primarily engaged in manufacturing computer terminals and other computer peripheral equipment (except storage devices).⁶⁹ The SBA has developed a small business size standard for this category of manufacturing: that size standard is 1,250 employees.⁷⁰ Economic Census

⁶¹ U.S. Census Bureau, 2007 NAICS Definitions, “334111 Electronic Computer Manufacturing”; <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334111&search=2007%20NAICS%20Search>.

⁶² 13 CFR § 121.201; NAICS Code 334111.

⁶³

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_31SG2&prodType=table.

⁶⁴ U.S. Census Bureau, 2012 NAICS Definitions, 334210 Telephone Apparatus Manufacturing, <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

⁶⁵ *Id.*

⁶⁶ 13 CFR § 121.201, NAICS Code 334210.

⁶⁷ U.S. Census Bureau, 2012 Economic Census of the United States, Table, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG2&prodType=table.

⁶⁸ *Id.*

⁶⁹ <https://www.census.gov/cgi-bin/ssd/naics/naicsrch>.

⁷⁰ 13 CFR § 121.201, NAICS Code 334118.

data for 2012 indicate that 626 establishments were operational throughout that year. Of that number, 527 establishments operated with less than 1,000 employees.⁷¹ Thus, we conclude that a majority of Computer Terminal and Other Computer Peripheral Equipment Manufacturing establishments are small entities.

b. Manufacturers of Equipment to Provide Electronic Messaging

22. Entities that manufacture equipment (other than software) used to provide electronic messaging services are generally found in one of three Census Bureau categories: “Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing,” “Electronic Computer Manufacturing,” or “Telephone Apparatus Manufacturing.”⁷²

23. *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing.* The Census Bureau defines this industry as comprising “establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by the establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.”⁷³ The SBA has established a size standard for this industry that classifies any business in this industry as small if it has 750 or fewer employees.⁷⁴ Census Bureau data for 2012 show that 841 establishments operated in this industry in that year. Of that number, 819 establishments operated with less than 500 employees.⁷⁵ Based on this data, we conclude that a majority of businesses in this industry are small by the SBA standard.

c. Manufacturers of Equipment to Provide Interoperable Video Conferencing Services

24. *Other Communications Equipment Manufacturing.* “This industry comprises establishments primarily engaged in manufacturing communications equipment (except telephone apparatus, and radio and television broadcast, and wireless communications equipment). Examples of such manufacturing include fire detection and alarm systems manufacturing, Intercom systems and equipment manufacturing, and signals (e.g., highway, pedestrian, railway, traffic) manufacturing.”⁷⁶ The SBA has established a size standard for this industry as 750 employees or less.⁷⁷ Census data for 2012 show that 383 establishments operated in that year. Of that number, 379 operated with less than 500 employees.⁷⁸ Based on that data, we conclude that the majority of Other Communications Equipment Manufacturers are small.

⁷¹

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_31SG2prodType=table.

⁷² The categories “Electronic Computer Manufacturing” and “Telephone Apparatus Manufacturing” are discussed above under the heading “Manufacturers of Equipment to Provide VoIP.”

⁷³ U.S. Census Bureau, North American Industry Classification System, Definition of NAICS Code 334220. *See* <http://www.census.gov/cgi-bin/sssd/naics/naicsrch> (last visited Oct. 28, 2015).

⁷⁴ 13 CFR § 121.201; NAICS Code 334220.

⁷⁵

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_31SG2&prodType=table.

⁷⁶ U.S. Census Bureau, 2012 NAICS Definitions, 334290 - Other communications equipment manufacturing, <https://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

⁷⁷ *See* 13 CFR § 121.201, NAICS Code 334290.

⁷⁸

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_31SG2&prodType=table.

d. Manufacturers of Software

25. *Software Publishers.* Entities that publish software used to provide interconnected VoIP, non-interconnected VoIP, electronic messaging services, or interoperable video conferencing services are found in the Census Bureau category “Software Publishers.” “This industry comprises establishments primarily engaged in computer software publishing or publishing and reproduction. Establishments in this industry carry out operations necessary for producing and distributing computer software, such as designing, providing documentation, assisting in installation, and providing support services to software purchasers. These establishments may design, develop, and publish, or publish only.”⁷⁹ The SBA has established a size standard for this industry of annual receipts of \$38.5 million per year.⁸⁰ Census data for 2012 indicate that 5,079 firms operated in that year. Of that number, 4,697 firms had annual receipts of \$25 million or less.⁸¹ Based on that data, we conclude that a majority of firms in this industry are small.

D. Description of Projected Reporting, Record Keeping and other Compliance Requirements

26. The rule changes adopted in the Report and Order to permit support for RTT in lieu of TTY Technologies in all IP-based wireless services do not modify reporting, recordkeeping, and other compliance requirements. However, the Report and Order requires that notice conditions imposed on waiver recipients remain in effect until the full implementation of the rules adopted in the Report and Order. The waiver recipients must continue to apprise their customers, through effective and accessible channels of communication, that (1) until TTY is sunset, TTY technology will not be supported for calls to 911 services over IP-based wireless services, and (2) there are alternative public switched telephone network (PSTN)-based and IP-based accessibility solutions for people with communication disabilities to reach 911 services. These notices must be developed in coordination with PSAPs and national consumer organizations, and include a listing of text-based alternatives to 911, including, but not limited to, TTY capability over the PSTN, various forms of PSTN-based and IP-based TRS, and text-to-911 (where available). The waiver recipients must also file a report every six months regarding their progress toward and the status of the availability of new IP-based accessibility solutions, such as RTT.⁸² The only entities that will be affected by this requirement are those entities that have previously petitioned for and received or will receive a waiver of the TTY obligations. We believe the only burden associated with the reporting requirement will be the time required to continue to prepare and send out notifications to customers and to complete the progress and status report every six months.

E. Steps Taken to Minimize Significant Impact on Small Entities and Significant Alternatives Considered

27. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following

⁷⁹ U.S. Census Bureau, North American Industry Classification System, Definition of NAICS Code 511210, <https://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

⁸⁰ See 13 CFR § 121.201, NAICS Code 511210.

⁸¹

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ4&prodType=table.

⁸² See e.g., *Petition for Waiver of Rules Requiring Support of TTY Technology*, Order, 30 FCC Rcd 10855 (CGB, PSHSB, WTB, WCB 2015) (granting waiver to AT&T); *Petition for Waiver of Rules Requiring Support of TTY Technology*, Order, 30 FCC Rcd 12755 (CGB, PSHSB, WTB, WCB 2015) (granting waiver to Verizon); *Petition for Waiver of Rules Requiring Support of TTY Technology*, 30 FCC Rcd 14404 (CGB PSHSB WTB WCB 2015) (granting waiver to Cellular South, Inc.), *modified*, Letter Order, 31 FCC Rcd 201 (CGB PSHSB WTB WCB 2016); *Petition for Waiver of Rules Requiring Support of TTY Technology*, Order, 31 FCC Rcd 3778 (CGB PSHSB WTB WCB 2016) (granting waiver to the Competitive Carriers Association).

four alternatives (among others): “(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) the use of performance rather than design standards; and (4) an exemption from coverage of the rule, or any part thereof, for such small entities.”⁸³

28. In amending our rules, we believe that we have minimized the effect on small entities while facilitating an effective and seamless transition from TTY technology to RTT. The Commission had considered other possible proposals and sought comment on the requirements and the analysis presented. The requirements adopted by the Commission to provide notices to customers and file reports with the Commission apply only to entities that have specifically sought waivers of the TTY obligations. Further, RTT technology may simplify the accessibility obligations of small businesses, because RTT allows calls to be made using the built-in functionality of a wide selection of off-the shelf devices such as cellphones, and thus may alleviate the high costs and challenges faced by small businesses and customers in locating dedicated external assistive devices, such as specialty phones. Additionally, in phasing out TTY technology, the burden is reduced for small entities and emergency call centers to maintain such technology in the long term.

29. The Commission also establishes a phased timeline for implementation of RTT technology. In response to comments in the proceeding and to reduce the burden and relieve possible adverse economic impact on small entities, by December 31, 2017, each Tier I CMRS provider and, by June 30, 2020, each non-Tier I provider may choose to support RTT in lieu of TTY over IP facilities. The Commission establishes a second period for each Tier I CMRS provider and non-Tier I CMRS provider choosing to support RTT in lieu of TTY over IP facilities to be required to support RTT for all new authorized user devices. Tier I CMRS providers must meet this requirement by December 31, 2019, and non-Tier I providers must meet this requirement by June 30, 2021. Manufacturers that provide devices for CMRS providers’ IP-based voice services and that choose to support RTT in lieu of TTY technology shall implement RTT in newly manufactured equipment by December 31, 2018, if readily achievable or unless not achievable, as applicable.

30. In addition, the Commission is permitting rather than requiring service providers to support RTT. With regards to implementing RTT, while the Commission adopts a “safe harbor” technical standard to ensure RTT interoperability, it also allows service providers to use alternative protocols for RTT, provided that they are interoperable. Further, throughout the item, flexibility is integrated into the criteria for RTT support in order to take into consideration the limitations of small businesses. For example, a service provider choosing to support RTT rather than TTY is not required to support RTT on new authorized end user devices to the extent that is not achievable for a particular manufacturer to support RTT on that provider’s network. As such, the Commission anticipates that the requirements will have little to no impact on small entities that are eligible to rely on the claim that supporting RTT on a particular device is not achievable.

31. The Commission also determined to establish outreach and education guidelines to encourage rather than require service providers and manufacturers to implement efforts to notify consumers about the transition from TTY technology to RTT, and to allow small entities to determine the extent of resources they allocate to inform consumers of the changes in the services and associated equipment they will be receiving.

F. Federal Rules Which Duplicate, Overlap, or Conflict With, the Commission’s Proposals

32. None.

⁸³ 5 U.S.C. §§ 603(c)(1)-(4).

APPENDIX D

Initial Regulatory Flexibility Analysis

1. As required by the Regulatory Flexibility Act, as amended (RFA),¹ the Commission has prepared this Initial Regulatory Flexibility Analysis (IRFA) of the possible significant economic impact on a substantial number of small entities by the policies and rules proposed in this Further Notice of Proposed Rule Making (*Further Notice*). Written public comments are requested on this IRFA. Comments must be identified as responses to the IRFA and must be filed by the deadlines for comments specified in the *Further Notice*. The Commission will send a copy of this *Further Notice*, including this IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA).² In addition, the *Further Notice* and IRFA (or summaries thereof) will be published in the Federal Register.³

A. Need for, and Objectives of, the Proposed Rules

2. In this *Further Notice*, the Commission seeks to continue the transition from outdated text telephony (TTY) technology to a reliable and interoperable means of providing real-time text (RTT) communication over Internet Protocol (IP) enabled networks and services for people who are deaf, hard of hearing, speech disabled, and deaf-blind. Real-time text is a mode of communication that permits text to be sent immediately as it is being created. The Commission's action seeks to ensure that people who are deaf, hard of hearing, speech disabled, and deaf-blind can fully utilize and benefit from twenty-first century communications technologies as the United States migrates from legacy circuit-switched systems to IP-based networks and services.

- The Commission seeks comment on :
- Setting an appropriate timeline or trigger for the sunset of service providers' obligation to ensure backward compatibility between RTT and TTY technology, and a proposal of a date of 2021 for this purpose;
- Integrating RTT into the provision of TRS; and
- Addressing the RTT needs of people with cognitive disabilities and people who are deaf-blind through the provision of block mode transmission and through connectivity with refreshable Braille displays.

B. Legal Basis

3. The proposed action is authorized under sections 1, 2, 4(i), 225, 251, 255, 303, 316, and 716 of the Communications Act of 1934, as amended, section 6 of the Wireless Communications and Public Safety Act of 1999, and section 106 of the CVAA; 47 U.S.C. §§ 151, 152, 154(i), 225, 255, 303, 316, 615a-1, 615c, 617.

C. Description and Estimate of the Number of Small Entities to Which the Proposed Rules Will Apply

4. The RFA directs agencies to provide a description and, where feasible, an estimate of the number of small entities that may be affected by the proposed rules, if adopted.⁴ The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small

¹ See 5 U.S.C. § 603. The RFA, *see id.* § 601 et seq., has been amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), Pub. L. No. 104-121, Title II, 110 Stat. 857 (1996).

² See 5 U.S.C. § 603(a).

³ See *id.*

⁴ See 5 U.S.C. § 603(b)(3).

organization,” and “small governmental jurisdiction.”⁵ In addition, the term “small business” has the same meaning as the term “small-business concern” under the Small Business Act.⁶ A “small-business concern” is one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the SBA.⁷

5. The majority of the proposals in the *Further Notice* will affect obligations on telecommunications carriers and providers, VoIP service providers, wireline and wireless service providers, advanced communications services (ACS) providers, and telecommunications equipment and software manufacturers. Other entities, however, that choose to object to the substitution of RTT for TTY technology under the Commission’s new proposed rules may be economically impacted by the proposals in this *Further Notice*.

6. A small business is an independent business having less than 500 employees. Nationwide, there are approximately 28.8 million small businesses, according to the SBA.⁸ Affected small entities as defined by industry are as follows.

1. Wireline Providers

7. *Wired Telecommunications Carriers*. The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”⁹ The SBA has developed a small business size standard for Wired Telecommunications Carriers, which consists of all such companies having 1,500 or fewer employees.¹⁰ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.¹¹ Thus, under this size standard, the majority of firms in this industry can be considered small.

8. *Local Exchange Carriers (LECs)*. Neither the Commission nor the SBA has developed a size standard for small businesses specifically applicable to local exchange services. The closest applicable size standard under SBA rules is for Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.¹² The U.S. Census Bureau defines

⁵ *Id.* § 601(6).

⁶ *See id.* § 601(3) (incorporating by reference the definition of “small-business concern” in the Small Business Act, 15 U.S.C. § 632). Pursuant to 5 U.S.C. § 601(3), the statutory definition of a small business applies “unless an agency, after consultation with the Office of Advocacy of the Small Business Administration and after opportunity for public comment, establishes one or more definitions of such term which are appropriate to the activities of the agency and publishes such definition(s) in the Federal Register.”

⁷ *See* 15 U.S.C. § 632(l).

⁸ *See* SBA, Office of Advocacy, *Frequently Asked Questions* (June 2016), https://www.sba.gov/sites/default/files/advocacy/SB-FAQ-2016_WEB.pdf.

⁹ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

¹⁰ *See* 13 CFR § 120.201, NAICS Code 517110.

¹¹ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

¹² 13 CFR § 121.201; NAICS code 517110.

this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”¹³ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.¹⁴ According to Commission data, 1,307 carriers reported that they were incumbent local exchange service providers.¹⁵ Of these 1,307 carriers, an estimated 1,006 have 1,500 or fewer employees and 301 have more than 1,500 employees.¹⁶ Consequently, the Commission estimates that most providers of local exchange service are small entities.

9. *Incumbent Local Exchange Carriers (Incumbent LECs)*. Neither the Commission nor the SBA has developed a small business size standard specifically for incumbent local exchange services. The closest applicable size standard under SBA rules is for the category Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.¹⁷ The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”¹⁸ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.¹⁹ According to Commission data,²⁰ 1,307 carriers reported that they were incumbent local exchange service providers.²¹ Of these 1,307 carriers, an estimated 1,006 have 1,500 or fewer employees and 301 have more than 1,500 employees.²² Consequently, the Commission estimates that most providers of incumbent local exchange service are small entities.

¹³ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

¹⁴ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

¹⁵ Federal Communications Commission, Wireline Competition Bureau, Industry Analysis and Technology Division, *Trends in Telephone Service*, tbl. 5.3 (Sept. 2010), https://apps.fcc.gov/edocs_public/attachmatch/DOC-301823A1.pdf (*Trends in Telephone Service*).

¹⁶ *See id.*

¹⁷ 13 CFR § 121.201; NAICS code 517110.

¹⁸ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

¹⁹ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

²⁰ *See Trends in Telephone Service* at tbl. 5.3.

²¹ *See id.*

²² *See id.*

10. We have included small incumbent LECs in this present RFA analysis. As noted above, a “small business” under the RFA is one that, *inter alia*, meets the pertinent small business size standard (e.g., a telephone communications business having 1,500 or fewer employees), and “is not dominant in its field of operation.”²³ The SBA’s Office of Advocacy contends that, for RFA purposes, small incumbent LECs are not dominant in their field of operation because any such dominance is not “national” in scope.²⁴ We have therefore included small incumbent LECs in this RFA analysis, although we emphasize that this RFA action has no effect on Commission analyses and determinations in other, non-RFA contexts.

11. *Competitive Local Exchange Carriers (Competitive LECs), Competitive Access Providers (CAPs), Shared-Tenant Service Providers, and Other Local Service Providers.* Neither the Commission nor the SBA has developed a small business size standard specifically for these service providers. The appropriate size standard under SBA rules is for the category Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.²⁵ The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”²⁶ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.²⁷ According to Commission data, 1,442 carriers reported that they were engaged in the provision of either competitive local exchange services or competitive access provider services.²⁸ Of these 1,442 carriers, an estimated 1,256 have 1,500 or fewer employees and 186 have more than 1,500 employees.²⁹ In addition, 17 carriers have reported that they are Shared-Tenant Service Providers, and all 17 are estimated to have 1,500 or fewer employees.³⁰ In addition, 72 carriers have reported that they are Other Local Service Providers.³¹ Of the 72, seventy have 1,500 or fewer employees and two have more than 1,500 employees.³² Consequently, the Commission estimates that most providers of competitive local exchange service, competitive access providers, Shared-Tenant Service Providers, and other local service providers are small entities.

²³ 5 U.S.C. § 601(3).

²⁴ Letter from Jere W. Glover, Chief Counsel for Advocacy, SBA, to William E. Kennard, Chairman, Federal Communications Commission (filed May 27, 1999). The Small Business Act contains a definition of “small business concern,” which the RFA incorporates into its own definition of “small business.” 15 U.S.C. § 632(a); 5 U.S.C. § 601(3). SBA regulations interpret “small business concern” to include the concept of dominance on a national basis. 13 CFR § 121.102(b).

²⁵ 13 CFR § 121.201; NAICS code 517110.

²⁶ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

²⁷ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

²⁸ See *Trends in Telephone Service* at tbl. 5.3.

²⁹ See *id.*

³⁰ See *id.*

³¹ See *id.*

³² See *id.*

12. *Interexchange Carriers.* Neither the Commission nor the SBA has developed a small business size standard specifically for providers of interexchange services. The appropriate size standard under SBA rules is for the category Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.³³ The U.S. Census Bureau defines this industry as “establishments primarily engaged in operating and/or providing access to transmission facilities and infrastructure that they own and/or lease for the transmission of voice, data, text, sound, and video using wired communications networks. Transmission facilities may be based on a single technology or a combination of technologies. Establishments in this industry use the wired telecommunications network facilities that they operate to provide a variety of services, such as wired telephony services, including VoIP services, wired (cable) audio and video programming distribution, and wired broadband internet services. By exception, establishments providing satellite television distribution services using facilities and infrastructure that they operate are included in this industry.”³⁴ Census data for 2012 shows that there were 3,117 firms that operated that year. Of this total, 3,083 operated with fewer than 1,000 employees.³⁵ According to Commission data, 359 carriers have reported that they are engaged in the provision of interexchange service.³⁶ Of these, an estimated 317 have 1,500 or fewer employees and 42 have more than 1,500 employees.³⁷ Consequently, the Commission estimates that the majority of interexchange carriers are small entities.

13. *Other Toll Carriers.* Neither the Commission nor the SBA has developed a size standard for small businesses specifically applicable to Other Toll Carriers. This category includes toll carriers that do not fall within the categories of interexchange carriers, operator service providers, prepaid calling card providers, satellite service carriers, or toll resellers. The closest applicable size standard under SBA rules is for Wired Telecommunications Carriers. Under that size standard, such a business is small if it has 1,500 or fewer employees.³⁸ According to Commission data, 284 companies reported that their primary telecommunications service activity was the provision of other toll carriage.³⁹ Of these, an estimated 279 have 1,500 or fewer employees and five have more than 1,500 employees.⁴⁰ Consequently, the Commission estimates that most Other Toll Carriers are small entities.

2. Wireless Providers

14. *Wireless Telecommunications Carriers (except Satellite).* Since 2007, the Census Bureau has placed wireless firms within this new, broad, economic census category.⁴¹ The Census Bureau defines this industry as comprising “establishments engaged in operating and maintaining switching and transmission facilities to provide communications via the airwaves. Establishments in this industry have spectrum licenses and provide services using that spectrum, such as cellular phone services, paging

³³ 13 CFR § 121.201; NAICS code 517110.

³⁴ <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

³⁵ http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ2&prodType=table.

³⁶ *Trends in Telephone Service* at tbl. 5.3.

³⁷ *See id.*

³⁸ *See* 13 CFR § 121.201; NAICS code 517110.

³⁹ *See Trends in Telephone Service* at tbl. 5.3.

⁴⁰ *See id.*

⁴¹ U.S. Census Bureau, 2012 NAICS Definitions, 517210 Wireless Telecommunications Categories (Except Satellite), <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517210&search=2012%20NAICS%20Search> (last visited Apr. 28, 2016).

services, wireless Internet access, and wireless video services.”⁴² Under the present and prior categories, the SBA has deemed a wireless business to be small if it has 1,500 or fewer employees.⁴³ For the category of Wireless Telecommunications Carriers (except Satellite), census data for 2012 show that there were 967 firms that operated for the entire year. Of this total, 955 firms had fewer than 1,000 employees.⁴⁴ Since all firms with fewer than 1,500 employees are considered small, given the total employment in the sector, we estimate that the vast majority of wireless firms are small entities.

3. Cable Service Providers

15. Cable Companies and Systems (Rate Regulation). The Commission has developed its own small business size standards for the purpose of cable rate regulation. Under the Commission's rules, a “small cable company” is one serving 400,000 or fewer subscribers nationwide.⁴⁵ Industry data indicate that there are currently 4,600 active cable systems in the United States.⁴⁶ Of this total, all but nine cable operators nationwide are small under the 400,000-subscriber size standard.⁴⁷ In addition, under the Commission's rate regulation rules, a “small system” is a cable system serving 15,000 or fewer subscribers.⁴⁸ Current Commission records show 4,600 cable systems nationwide.⁴⁹ Of this total, 3,900 cable systems have fewer than 15,000 subscribers, and 700 systems have 15,000 or more subscribers.⁵⁰ Thus, under this standard, we estimate that most cable systems are small entities.

4. All Other Telecommunications

16. *All Other Telecommunications*. The Census Bureau defines this industry as including “establishments primarily engaged in providing specialized telecommunications services, such as satellite tracking, communications telemetry, and radar station operation. This industry also includes establishments primarily engaged in providing satellite terminal stations and associated facilities connected with one or more terrestrial systems and capable of transmitting telecommunications to, and receiving telecommunications from, satellite systems. Establishments providing Internet services or Voice over Internet Protocol (VoIP) services via client-supplied telecommunications connections are also included in this industry.”⁵¹ The SBA has developed a small business size standard for this category; that size standard is \$32.5 million or less in average annual receipts.⁵² For this category, census data for 2012,

⁴² U.S. Census Bureau, 2007 NAICS Definitions, 517210 Wireless Telecommunications Carriers (Except Satellite), <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=517210&search=2007%20NAICS%20Search> (last visited Apr. 28, 2016).

⁴³ 13 CFR § 121.201; NAICS code 517210 (2012 NAICS). The now-superseded, pre-2007 CFR citations were 13 CFR § 121.201, NAICS codes 517211 and 517212 (referring to the 2002 NAICS).

⁴⁴ U.S. Census Bureau, Subject Series: Information, Table 5, “Establishment and Firm Size: Employment Size of Firms for the United States: 2012 NAICS Code 517210,” http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ5&prodType=table.

⁴⁵ 47 CFR § 76.901(e).

⁴⁶ Data contained in the Commission’s Cable Operations and Licensing System (COALS), August 15, 2015 (COALS Data). See <https://apps.fcc.gov/coals/>.

⁴⁷ See SNL KAGAN at <https://snl.cominteractiveXtopcableMSOs.aspx?period2015Q1&sortcol=subscribersbasic&sortorder=desc>.

⁴⁸ 47 CFR § 76.901(c).

⁴⁹ COALS Data.

⁵⁰ *Id.*

⁵¹ U.S. Census Bureau, 2012 NAICS Definitions, 517919 All Other Telecommunications, <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?>

⁵² See 13 CFR § 121.201; NAICS code 517919.

there were 1,442 firms that operated for the entire year. Of these firms, a total of 1,400 had gross annual receipts of under \$25 million.⁵³ Consequently, we estimate that the majority of these firms are small entities.

17. *TRS Providers.* TRS providers are generally classified within the broad category of “All Other Telecommunications.” Seven providers currently receive compensation from the Interstate Telecommunications Relay Service (TRS) Fund for providing TRS: ASL Services Holdings, LLC; CSDVRS, LLC; Convo Communications, LLC; Hamilton Relay, Inc.; Purple Communications, Inc.; Sprint Communications, Inc. (Sprint); and Sorenson Communications, Inc. Six of the authorized TRS providers can be included within the broad economic census category of All Other Telecommunications.⁵⁴ The SBA has developed a small business size standard for All Other Telecommunications, which consists of all such firms with gross annual receipts of \$32.5 million or less.⁵⁵ For this category, census data for 2012 show that there were 1,442 firms that operated for the entire year. Of these firms, a total of 1,400 had gross annual receipts of less than \$25 million.⁵⁶ Under this category and the associated small business size standard, approximately half of the TRS providers can be considered small.

5. Equipment Manufacturers

a. Manufacturers of Equipment to Provide VoIP

18. Entities manufacturing equipment used to provide interconnected Voice over Internet Protocol (VoIP), non-interconnected VoIP, or both are generally found in one of two Census Bureau categories, “Electronic Computer Manufacturing”⁵⁷ or “Telephone Apparatus Manufacturing.”⁵⁸ While the Commission recognizes that the manufacturers of equipment used to provide interconnected VoIP will continue to be regulated under section 255 rather than under section 716,⁵⁹ we include here an analysis of the possible significant economic impact of our proposed rules on manufacturers of equipment used to provide both interconnected and non-interconnected VoIP. However, in the absence of more accurate data, we present these figures to provide as thorough an analysis of the impact on small entities as we can at this time.

19. *Electronic Computer Manufacturing.* The Census Bureau defines this category to include “. . . establishments primarily engaged in manufacturing and/or assembling electronic computers, such as mainframes, personal computers, workstations, laptops, and computer servers. Computers can be analog,

⁵³ U.S. Census Bureau, 2012 Economic Census, Information: Subject Series – Establishment and Firm Size: Table 4, “Receipts Size of Firms for the United States: 2012, NAICS Code 517919,” http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ4&prodType=table.

⁵⁴ Because Sprint’s primary business is wireless telecommunications, it fits within the definition of Wireless Telecommunications Carriers (except Satellite). As a result, Sprint is not considered to be within the category of All Other Telecommunications.

⁵⁵ See 13 CFR § 121.201; NAICS Code 517919.

⁵⁶

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ4&prodType=table.

⁵⁷ U.S. Census Bureau, 2007 NAICS Definitions, “334111 Electronic Computer Manufacturing”; <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334111&search=2007%20NAICS%20Search>.

⁵⁸ U.S. Census Bureau, 2007 NAICS Definitions, “334210 Telephone Apparatus Manufacturing”; <http://www.census.gov/naics/2007/def/nd334210.htm>.

⁵⁹ See 47 U.S.C. § 617(f) (stating that the requirements of section 716 shall not apply to any equipment or services, including interconnected VoIP service, subject to section 255 as of the date of enactment of section 716 and such equipment and services shall instead remain subject to the requirements of section 255); see also 47 CFR § 14.2(c).

digital, or hybrid. Digital computers, the most common type, are devices that do all of the following: (1) store the processing program or programs and the data immediately necessary for the execution of the program; (2) can be freely programmed in accordance with the requirements of the user; (3) perform arithmetical computations specified by the user; and (4) execute, without human intervention, a processing program that requires the computer to modify its execution by logical decision during the processing run. Analog computers are capable of simulating mathematical models and contain at least analog, control, and processing elements. The manufacture of computers includes the assembly of or integration of processors, co-processors, memory, storage, and input/output devices into a user-programmable final product. The manufacture of computers includes the assembly or integration of processors, coprocessors, memory, storage, and input/output devices into a user-programmable final product.”⁶⁰ In this category, the SBA has deemed an electronic computer manufacturing business to be small if it has fewer than 1,000 employees.⁶¹ Census data for 2007 indicate that 366 establishments in this category operated throughout that year. Of that number, 362 operated with less 1,000 employees.⁶² Consequently, we estimate that the majority of these establishments are small entities.

20. *Telephone Apparatus Manufacturing (wireline)*. The Census Bureau defines this category to comprise “establishments primarily engaged in manufacturing wire telephone and data communications equipment.”⁶³ The Census Bureau further states: “These products may be standalone or board-level components of a larger system. Examples of products made by these establishments are central office switching equipment, cordless telephones (except cellular), PBX equipment, telephones, telephone answering machines, LAN modems, multi-user modems, and other data communications equipment, such as bridges, routers, and gateways.”⁶⁴ In this category the SBA deems a telephone apparatus manufacturing business to be small if it has 1,000 or fewer employees.⁶⁵ For this category of manufacturers, Census data for 2012 showed that there were 266 such establishments that operated for that entire year.⁶⁶ Of those, 262 had fewer than 1,000 employees.⁶⁷ Thus, under this size standard, the majority of establishments in this industry can be considered small. On this basis, the Commission continues to estimate that approximately 99% or more of the manufacturers of equipment used to provide VoIP in this category are small entities.

21. *Computer Terminal and Other Computer Peripheral Equipment Manufacturing*. This U.S. industry comprises establishments primarily engaged in manufacturing computer terminals and other computer peripheral equipment (except storage devices).⁶⁸ The SBA has developed a small business size standard for this category of manufacturing: that size standard is 1,250 employees.⁶⁹ Economic Census

⁶⁰ U.S. Census Bureau, 2007 NAICS Definitions, “334111 Electronic Computer Manufacturing”; <http://www.census.gov/cgi-bin/sssd/naics/naicsrch?code=334111&search=2007%20NAICS%20Search>.

⁶¹ 13 CFR § 121.201; NAICS Code 334111.

⁶²

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_31SG2&prodType=table.

⁶³ U.S. Census Bureau, *2012 NAICS Definitions*, 334210 Telephone Apparatus Manufacturing, <http://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

⁶⁴ *Id.*

⁶⁵ 13 CFR § 121.201, NAICS Code 334210.

⁶⁶ U.S. Census Bureau, *2012 Economic Census of the United States*, Table, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2007_US_31SG2&prodType=table.

⁶⁷ *Id.*

⁶⁸ <https://www.census.gov/cgi-bin/ssd/naics/naicsrch>.

⁶⁹ 13 CFR § 121.201, NAICS Code 334118.

data for 2012 indicate that 626 establishments were operational throughout that year. Of that number, 527 establishments operated with less than 1,000 employees.⁷⁰ Thus, we conclude that a majority of Computer Terminal and Other Computer Peripheral Equipment Manufacturing establishments are small entities.

b. Manufacturers of Equipment to Provide Electronic Messaging

22. Entities that manufacture equipment (other than software) used to provide electronic messaging services are generally found in one of three Census Bureau categories: “Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing,” “Electronic Computer Manufacturing,” or “Telephone Apparatus Manufacturing.”⁷¹

23. *Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing.* The Census Bureau defines this industry as comprising “establishments primarily engaged in manufacturing radio and television broadcast and wireless communications equipment. Examples of products made by the establishments are: transmitting and receiving antennas, cable television equipment, GPS equipment, pagers, cellular phones, mobile communications equipment, and radio and television studio and broadcasting equipment.”⁷² The SBA has established a size standard for this industry that classifies any business in this industry as small if it has 750 or fewer employees.⁷³ Census Bureau data for 2012 show that 841 establishments operated in this industry in that year. Of that number, 819 establishments operated with less than 500 employees.⁷⁴ Based on this data, we conclude that a majority of businesses in this industry are small by the SBA standard.

c. Manufacturers of Equipment to Provide Interoperable Video Conferencing Services

24. *Other Communications Equipment Manufacturing.* “This industry comprises establishments primarily engaged in manufacturing communications equipment (except telephone apparatus, and radio and television broadcast, and wireless communications equipment). Examples of such manufacturing include fire detection and alarm systems manufacturing, Intercom systems and equipment manufacturing, and signals (e.g., highway, pedestrian, railway, traffic) manufacturing.”⁷⁵ The SBA has established a size standard for this industry as 750 employees or less.⁷⁶ Census data for 2012 show that 383 establishments operated in that year. Of that number, 379 operated with less than 500 employees.⁷⁷ Based on that data, we conclude that the majority of Other Communications Equipment Manufacturers are small.

⁷⁰

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_31SG2prodType=table.

⁷¹ The categories “Electronic Computer Manufacturing” and “Telephone Apparatus Manufacturing” are discussed above under the heading “Manufacturers of Equipment to Provide VoIP.”

⁷² U.S. Census Bureau, North American Industry Classification System, Definition of NAICS Code 334220. *See* <http://www.census.gov/cgi-bin/sssd/naics/naicsrch> (last visited Oct. 28, 2015).

⁷³ 13 CFR § 121.201; NAICS Code 334220.

⁷⁴

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_31SG2&prodType=table.

⁷⁵ U.S. Census Bureau, 2012 NAICS Definitions, 334290 - Other communications equipment manufacturing, <https://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

⁷⁶ *See* 13 CFR § 121.201, NAICS Code 334290.

⁷⁷

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_31SG2&prodType=table.

d. Manufacturers of Software

25. *Software Publishers.* Entities that publish software used to provide interconnected VoIP, non-interconnected VoIP, electronic messaging services, or interoperable video conferencing services are found in the Census Bureau category “Software Publishers.” “This industry comprises establishments primarily engaged in computer software publishing or publishing and reproduction. Establishments in this industry carry out operations necessary for producing and distributing computer software, such as designing, providing documentation, assisting in installation, and providing support services to software purchasers. These establishments may design, develop, and publish, or publish only.”⁷⁸ The SBA has established a size standard for this industry of annual receipts of \$38.5 million per year.⁷⁹ Census data for 2012 indicate that 5,079 firms operated in that year. Of that number, 4,697 firms had annual receipts of \$25 million or less.⁸⁰ Based on that data, we conclude that a majority of firms in this industry are small.

D. Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

26. The *Further Notice* seeks comment on integrating RTT into the provision of TRS, requiring certain additional features and capabilities of RTT, and the appropriate timeline to sunset the requirement for backward compatibility of RTT with TTY technology. With the following exception, these proposals do not include new or modified reporting, recordkeeping, and other compliance requirements. Specifically, the *Further Notice* seeks comment on the type of data that should be collected to help the Commission determine the extent to which RTT reduces reliance on telecommunications relay services (TRS) or alternatively the extent to which the introduction of RTT increases TRS use among some consumers because it has enhanced the ability of TRS to provide functionally equivalent telephone service.

E. Steps taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

27. The RFA requires an agency to describe any significant, specifically small business, alternatives that it has considered in reaching its proposed approach, which may include the following four alternatives (among others): “(1) the establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) the clarification, consolidation, or simplification of compliance or reporting requirements under the rule for small entities; (3) the use of performance, rather than design, standards; and (4) an exemption from coverage of the rule, or any part thereof, for small entities.”

28. In the *Further Notice*, the Commission seeks comment on the type of data and metrics that can be used to monitor the availability, adoption, and acceptance of RTT services and devices. This information is intended to help the Commission determine when TTY users have transitioned to RTT to a point that would warrant elimination of the requirement for RTT to be backward compatibility with TTY. While the collection of data may initially burden small businesses, the eventual sunset of the obligation to ensure that RTT is backward compatibility with TTY will in the long run reduce the burden for small entities and emergency call centers to maintain TTY technology and backward compatibility capability.

29. The Commission also seeks comments on the costs, benefits, feasibility, and appropriate timeline for requiring IP-based TRS providers to incorporate RTT capability into the provision of their

⁷⁸ U.S. Census Bureau, North American Industry Classification System, Definition of NAICS Code 511210, <https://www.census.gov/cgi-bin/sssd/naics/naicsrch>.

⁷⁹ See 13 CFR § 121.201, NAICS Code 511210.

⁸⁰

http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ECN_2012_US_51SSSZ4&prodType=table.

services. The information requested will inform the Commission of concerns with the transition and appropriate timelines for all entities, which will allow the Commission to consider rules and implementation deadlines that minimize burdens and relieve possible adverse economic impact on small entities. The Commission's gathering of information to determine the effect of RTT on TRS services and the TRS Fund will allow the Commission to consider changes to the rules that may minimize burdens and relieve possible adverse economic impact on small entities.

30. In the *Further Notice*, the Commission also seeks comment on identifying certain RTT features or functional capabilities, such as compatibility with refreshable braille displays and block mode transmission, that are necessary to meet the communication needs of individuals who are deaf-blind, people with cognitive disabilities, or other specific segments of the disability community. In seeking comments on feasibility, we seek to integrate flexibility into the requirements to take into consideration the limitations of small businesses. Because the Commission will require implementation of these features only if achievable, the Commission anticipates that there will be little to no impact on small entities that would claim the requirement is not achievable.

F. Federal Rules that May Duplicate, Overlap, or Conflict with the Commission's Proposals

31. None.

**STATEMENT OF
CHAIRMAN TOM WHEELER**

Re: *Transition from TTY to Real-Time Text Technology*, CG Docket No. 16-145; *Petition for Rulemaking to Update the Commission's Rules for Access to Support the Transition from TTY to Real-Time Text Technology*, and *Petition for Waiver of Rules Requiring Support of TTY Technology*, GN Docket No. 15-178, Report and Order and Further Notice of Proposed Rulemaking.

When our nation's telecommunications system was first established, it was created without considering the needs of people who are deaf and hard-of-hearing. As a consequence, people who are deaf, hard-of-hearing, and have speech disabilities were left out. It was only when three deaf men – Weitbrecht, Saks and Marsters – came up with the idea of using teletype machines to couple with telephones that the TTY was born in the 1960s. These individuals did what the telephone companies did not. They made telephone communication possible for people who could not hear or speak.

But the TTY has only served as a band-aid for a telecommunications system that remains largely inaccessible to people with hearing and speech disabilities. It is an antiquated technology that uses a long discarded protocol, and has considerable limitations – both in terms of its speed and reliability. In addition, it only works on specialized equipment, keeping its users in telephone silos – apart from the mainstream telephone network that the rest of us use.

Real-time text, as a native IP technology designed for the packet-switched network environment, has been recognized internationally as an effective replacement for TTY technology. The universal availability of real-time text in virtually any off-the-shelf end user wireless device will allow both people with disabilities and people without disabilities to adopt this solution seamlessly and ubiquitously.

We now have the opportunity – as we design our new communications system that is based on Internet-protocol – to finally make our nation's communications systems accessible to everyone.

In some places, this item sets out basic requirements for how to do this. In others, it offers strong guidance on how to achieve this in a way that will ensure that people with disabilities have the same access as voice telephone users.

It is now up to industry to get this right. It will be critical to work with consumers on this – to confer with people with disabilities about their needs, and the features that are essential to making real-time text a successful alternative to TTYs and voice services. We understand that a lot of industry-consumer collaboration has already occurred on bringing us to this point. Let's make it to the finish line.

I would like to thank many individuals and consumer organizations who contributed to this proceeding, many of whom have representatives here today. In particular, I'd like to recognize the National Association of the Deaf, Telecommunications for the Deaf, the Hearing Loss Association of America, Communication Service for the Deaf, the Northern Virginia Resource Center for Deaf and Hard of Hearing Persons, Gregg Vanderheiden of the Trace Center and, finally, Gallaudet University who is represented by their President Bobbi Cordano and Christian Vogler.

Thank you to the wireless service providers, who have engaged on this issue, and who already have made significant progress on the deployment of real-time text. Their leadership has brought us to this point.

Finally, thank you to the Commission staff for their work on this item. Frankly, I'm disappointed that this particular item did not go further. But I could not be prouder of what our Disability Rights Office and FCC team have accomplished over the past four years to make communications technology more accessible to people with disabilities. We prioritized text-to-911 availability, improved accessibility of emergency information on "second screen" devices, adopted closed captioning quality standards, expanded hearing aid compatibility obligations to cover modern wireless devices, utilized and promoted greater use of customer support via American Sign Language on videophones, made our deaf-blind

equipment distribution program permanent, established a Disability Advisory Committee, and sought to highlight the need for more video-described programming. Special thanks to Karen Peltz Strauss and CGB Directors Alison Kutler and Kris Monteith for their leadership, which made this progress possible.

**STATEMENT OF
COMMISSIONER MIGNON L. CLYBURN**

Re: *Transition from TTY to Real-Time Text Technology*, CG Docket No. 16-145; *Petition for Rulemaking to Update the Commission's Rules for Access to Support the Transition from TTY to Real-Time Text Technology*, and *Petition for Waiver of Rules Requiring Support of TTY Technology*, GN Docket No. 15-178, Report and Order and Further Notice of Proposed Rulemaking

So, there we were: Bottom of the ninth, bases loaded, visitors up by one. Our home team was up at bat. Those of us watching from the stands were really hoping for a grand slam, but as fate would have it, the third base player was the only one who made it to home plate. Today, we fall short of a grand slam that seemed so much within reach just a few days ago, but I am relieved to be able to say that we are still in the game.

President Cordano, I am admittedly disappointed that all of our runners failed to cross home plate, but like you, Mr. Claude Stout, those present and countless others, I remain hopeful that the path laid out before us is sufficiently clear to achieve the goal of a twenty-first century universal and integrated text solution for people with disabilities. Real-time text promises a future where everyone can seamlessly connect with friends, family and emergency services without specialized equipment. It is a future where a father who is deaf can easily and reliably keep in touch with his daughter during her semester abroad, or a speech disabled homeowner can quickly secure the services of the plumber of his choice, or a hard of hearing grandmother can simultaneously speak to and text her grandson during their weekly call.

Our action today will no doubt have a positive ripple effect worldwide – for we are trendsetters, both domestically and internationally, and it is no understatement to say that with this item we are poised to open up a world of possibilities for members of our communities who in too many ways remain separated from mainstream society.

So yes, this is a momentous occasion, but I trust we will all agree, it represents just the first of many steps we must take, and now, if you will forgive me for continuing with the sports analogies, we will pass the baton to the wireless service providers and manufacturers, to get us all to the finish line. I know you are committed to making real-time text work, and I thank you for that. But I am also looking to you, relying on you, urging you, to provide the necessary support for real-time text, in order for it to fulfill its promise. Continue to work with consumer groups to ensure that the needs of the communities they represent are met by implementing features and capabilities that support successful deployment and broad adoption of real-time text. This is your chance to show us that you, that the market, can successfully address these issues without a mandate from us to do so.

And to the consumer advocates, who worked tirelessly over the past 15 years to get to this historic moment, I say thank you for your persistence, perseverance and passion. You have much to be proud of today. To Alison Kutler, Karen Peltz Strauss and the Consumer and Governmental Affairs Bureau staff, who spent countless hours writing and re-writing this item, you are indeed first in class. Your unwavering commitment to advancing policies that tangibly and positively impact the lives of Americans with disabilities is truly inspiring.

**STATEMENT OF
COMMISSIONER JESSICA ROSENWORCEL**

Re: *Transition from TTY to Real-Time Text Technology*, CG Docket No. 16-145; *Petition for Rulemaking to Update the Commission’s Rules for Access to Support the Transition from TTY to Real-Time Text Technology*, and *Petition for Waiver of Rules Requiring Support of TTY Technology*, GN Docket No. 15-178, Report and Order and Further Notice of Proposed Rulemaking

The digital world is fast becoming a more accessible and inclusive place. Already we have augmented reality tools that help blind travelers navigate physical reality. We have applications with screen reading functionality that enables the blind to read printed documents and signage. In the not too distant future, we will have gloves with wireless sensors that can translate sign language into text and speech in real time. This is exciting—and life-altering—stuff.

Now back to the present. Somehow, somehow, text telephony technology, or TTY, is still a prominent feature of our access policies. But let’s be honest: it’s a relic. TTY was first widely deployed in the 1970’s to help deaf, hard-of-hearing, and speech-disabled individuals send and receive person-to-person text over telephone lines. There was a time when it was revolutionary—but that date has long since passed. The machines lack the slim functionality and sleek features of today’s smartphones. They are bulky and cumbersome and ill-suited for transmission over modern IP networks. They belong under glass—in a museum dedicated to analog antiquity.

Today we take a step in that direction by updating our rules to allow the deployment of Real-Time Text in place of TTY over wireless IP-enabled networks. This is a step toward the future. That’s because Real-Time Text enables character by character text transmission without the need for specialized hardware. For those who choose to move forward, we require Real-Time Text to be interoperable across networks and devices as well as backward-compatible with TTY systems. Real-Time Text will also need to support 911 communications and simultaneous voice and text features. I hope in time Real-Time Text is universally available as a native function. But for now, transition to this technology will transition our accessibility policies to the future. And that’s something we should all support.

**STATEMENT OF
COMMISSIONER AJIT PAI**

Re: *Transition from TTY to Real-Time Text Technology*, CG Docket No. 16-145; *Petition for Rulemaking to Update the Commission’s Rules for Access to Support the Transition from TTY to Real-Time Text Technology*, and *Petition for Waiver of Rules Requiring Support of TTY Technology*, GN Docket No. 15-178, Report and Order and Further Notice of Proposed Rulemaking

This past spring, I had the chance to visit Gallaudet University and learn how real-time text (RTT) can improve the lives of people with hearing and speech disabilities. I met with Dr. Christian Vogler, the Director of Gallaudet’s Technology Access Program, as well as Research Associate Paula Tucker and Senior Research Engineer Norman Williams. They showed me how superior RTT technologies are to the clunky and antiquated TTY systems that have been in use for decades.

One of RTT’s advantages is that text is transmitted instantaneously. You don’t need to type out an entire message and then press “send” or use an intermediary to communicate. Dr. Vogler explained that this allows for a more natural conversation, since you can see and anticipate what the other person is trying to say. You also can communicate much more quickly and efficiently. This is particularly important when it comes to public safety, since 911 exchanges that would take minutes using a legacy technology can be completed in seconds using RTT.

RTT has other benefits as well. It is based on the Internet Protocol, or IP, which means it is a highly adaptable digital technology. It is interoperable across networks and devices, which means that consumers do not need to find or, in some cases, purchase specialized equipment. And it is far more reliable than legacy offerings, which means those who use it can have comfort that it’ll work in a moment of need.

In fact, there’s really only one problem: FCC rules have not kept up with the pace of technological change. Despite RTT’s clear consumer benefits, our rules have required carriers to continue to support legacy TTY systems. This has not only delayed the deployment of RTT, but has also held back the deployment of other services that consumers want—like Wi-Fi calling and Voice over LTE—because carriers found that they could not offer those services while meeting the FCC’s TTY requirement.

Thankfully, this changes today. Our *Order* gives carriers the flexibility to invest in and deploy RTT instead of TTY. This, in turn, will enable consumers—particularly those with hearing and speech disabilities—to take advantage of the benefits of advanced IP technologies.

I want to thank my colleagues for working in good faith to find common ground on this item, and I want to express my gratitude to the advocates in the hearing and speech disability community for the work you have done to advance this cause.

**STATEMENT OF
COMMISSIONER MICHAEL P. O'RIELLY**

Re: *Transition from TTY to Real-Time Text Technology*, CG Docket No. 16-145; *Petition for Rulemaking to Update the Commission's Rules for Access to Support the Transition from TTY to Real-Time Text Technology*, and *Petition for Waiver of Rules Requiring Support of TTY Technology*, GN Docket No. 15-178, Report and Order and Further Notice of Proposed Rulemaking.

The wireless industry and the disabilities community have high expectations for Real-Time Text (RTT), and our action today removes an obstacle to or facilitates its development and deployment, depending on your perspective, by amending existing Commission rules pertaining to teletypewriters. Whether it will ultimately be successful will be up to consumers, but, going forward, wireless providers and manufacturers can choose – but are not required – to implement RTT. If these entities decide to offer RTT, then they no longer need to support outdated and rarely used TTY technology on their respective wireless networks.

TTY is a system from a bygone era that is incompatible with IP networks and has been long superseded by commercially available solutions tailored to a world of mobile devices, the Internet and applications. While it is about time that the Commission's antiquated rules are modified and updated, I am pleased that the move to alternative technologies is being done here without imposing further technology mandates. Although it appears that the wireless industry is united and committed to moving forward with RTT, the Commission should not be in the business of dictating technology choices and picking winners and losers. Instead, such decisions should be driven by the free market and industry innovation. To argue that disability needs cannot be addressed without mandates and force ignores the modern reality of technology advancement and the interest of many in serving a desirable group of consumers.

Similarly, the Commission should not mandate the design of service offerings. Although those entities choosing to offer RTT in lieu of TTY do need to provide some basic functionalities, many other attributes, including whether RTT should be offered natively or as an application, latency and error rates, and character and text capabilities, are better left as recommendations and not requirements. RTT is a brand new system that has yet to be deployed. By allowing flexibility in functionality, RTT should be able to develop in a manner that will provide the greatest benefits to all American consumers as expeditiously as possible. Under this structure, industry will be able to work with the disabilities community and others to hopefully reach RTT's full potential.

These improvements from what was in the notice allow me to support this item. But there are still some things I am not enamored with. For instance, I would have preferred that manufacturers have no requirements in this area. Wireless providers should be able to work with manufacturers to obtain the necessary handsets without Commission involvement. In this case, however, manufacturers already fall under the accessibility and TTY requirements, so it makes some sense to include the changes contained within.

Additionally, some wireless providers have expressed concern about the use of RTT on non-service initialized (NSI) devices, which this item punts to the NSI 911 proceeding. As I have stated before, it is time for the Commission to resolve the NSI 911 issue once and for all. The Commission also needs to consider how RTT affects our text-to-911 requirement. Not surprisingly, there has been a lack of adoption by localities and PSAPs in which only one out of every five counties have operational text-to-911.¹ Specifically, we should examine whether our text-to-911 mandate should be pursued or altered

¹ See Adam Bender, *Text-to-911 Adoption Low Amid Local Cost Concerns*, Comm. Daily, Nov. 30, 2016.

given that Commission finding here that RTT communications to 911 are superior to SMS. And this means that we need to contemplate how RTT fits into the overall paradigm of NG911 and whether PSAPs should be required to support both technologies.

I thank the Chairman, my fellow commissioners, and staff for their efforts on this item and greatly appreciate the work that the wireless industry and disabilities community have done and will do to effectuate RTT.