6712-01

FEDERAL COMMUNICATIONS COMMISSION

47 CFR Parts 6, 7, 14, 20, 64, and 67

[CG Docket No. 16-145 and GN Docket No. 15-178; FCC 16-53]

Transition from TTY to Real-Time Text Technology

AGENCY: Federal Communications Commission.

ACTION: Proposed rule.

SUMMARY: In this document, the Commission proposes amendments to its rules to facilitate a transition from outdated text telephone (TTY) technology to a reliable and interoperable means of providing real-time text (RTT) communication for people who are deaf, hard of hearing, speech disabled, and deaf-blind over Internet Protocol (IP) enabled networks and services.

DATES: Comments are due **[INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]** and Reply Comments are due **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**.

ADDRESSES: You may submit comments, identified by CG Docket No. 16-145, by any of the following methods:

- Electronic Filers: Comments may be filed electronically using the Internet by accessing the Commission's Electronic Comment Filing System (ECFS), through the Commission's web site http://apps.fcc.gov/ecfs//. Filers should follow the instructions provided on the web site for submitting comments. For ECFS filers, in completing the transmittal screen, filers should include their full name, U.S. Postal service mailing address, and CG Docket No. 16-145.
- Paper Filers: Parties who choose to file by paper must file an original and one copy of each filing. Filings can be sent by hand or messenger delivery, by commercial overnight courier, or by first-class or overnight U.S. Postal Service mail (although the Commission continues to experience delays in receiving U.S. Postal Service mail). All

filings must be addressed to the Commission's Secretary, Office of the Secretary, Federal Communications Commission.

For detailed instructions for submitting comments and additional information on the rulemaking process, see the SUPPLEMENTARY INFORMATION section of this document.

FOR FURTHER INFORMATION CONTACT: Suzy Rosen Singleton, Consumer and Governmental Affairs Bureau, at 202-510-9446 or e-mail Suzanne.Singleton@fcc.gov, or Robert Aldrich, Consumer and Governmental Affairs Bureau, at 202-418-0996 or e-mail Robert.Aldrich@fcc.gov.

SUPPLEMENTARY INFORMATION: Pursuant to 47 CFR 1.415, 1.419, interested parties may file comments and reply comments on or before the dates indicated on the first page of this document. Comments may be filed using the Commission's ECFS. See Electronic Filing of Documents in Rulemaking Proceedings, 63 FR 24121 (1998).

- 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. All hand deliveries must be held together with rubber bands or fasteners. Any envelopes must be disposed of before entering the building.
- Commercial Mail sent by 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 should be addressed to 445 12th Street, SW, Washington, DC 20554.

This is a summary of the Commission's document FCC 16-53, Transition from TTY to Real-Time Text Technology, Notice of Proposed Rulemaking, adopted April 28, 2016, and released April 29, 2016, in CG Docket No. 16-145 and GN Docket No. 15-178. The full text of document FCC 16-53 will be available for public inspection and copying via ECFS, and during regular business hours at the FCC Reference Information Center, Portals II, 445 12th Street, SW, Room CY-A257, Washington, DC 20554. Document FCC 16-53 can also be downloaded in Word or

Portable Document Format (PDF) at: https://www.fcc.gov/general/disability-rights-office-headlines. This proceeding shall be treated as a "permit-but-disclose" proceeding in accordance with the Commission's ex parte rules. 47 CFR 1.1200 et seq. 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 presentation 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 47 CFR 1.1206(b). In proceedings governed by 47 CFR 1.49(f) 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.

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), 202-418-0432 (TTY).

INITIAL PAPERWORK REDUCTION ACT OF 1995 ANALYSIS

Document FCC 16-53 seeks comment on proposed rule amendments that may result in modified information collection requirements. If the Commission adopts any 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 Paperwork Reduction Act. Pub. L. 104-13; 44 U.S.C. 3501-3520. In addition, pursuant to the Small Business Paperwork Relief Act of 2002, the Commission seeks comment on how it might further reduce the information collection burden for small business concerns with fewer than 25 employees. Pub. L. 107-198; 44 U.S.C. 3506(c)(4).

SYNOPSIS:

Introduction

1. In document FCC 16-53, the Commission proposes amendments to its rules to facilitate a transition from outdated text telephone (TTY) technology to a reliable and interoperable means of providing real-time text (RTT) communication for people who are deaf, hard of hearing, speech disabled, and deaf-blind over Internet Protocol (IP) enabled networks and services. RTT is a mode of communication that permits text to be sent immediately as it is being created. As a technology designed for today's IP environment, and one that allows the use of off-the-shelf rather than specialized end user devices, RTT can, for the first time in our nation's history, enable people with disabilities who rely on text to use text-based communications services that are fully integrated with mainstream communications services and devices used by the general public. In addition, RTT's advanced features, including its speed, full character set, reliability, and ease of use, can significantly improve access to emergency services for people with disabilities and help reduce reliance on telecommunications relay services.

2. In order to facilitate an effective and seamless transition to RTT, the Commission proposes to amend its rules as follows:

- The Commission proposes to replace its rules governing the obligations of wireless service providers and equipment manufacturers to support TTY technology with rules defining the obligations of these entities to support RTT over IP-based wireless voice services.

- The Commission proposes that, for wireless service providers' and equipment manufacturers' support of RTT to be deemed sufficient for compliance with the Commission's rules:
    - RTT communications must be interoperable across networks and devices, and this may achieved through adherence to Internet Engineering Task Force (IETF) Request for Comments 4103, Real-time Transport Protocol Payload for Text Conversation (2005) (RFC 4103), as a "safe harbor" standard for RTT;
    - RTT communications must be backward compatible with TTY technology, until the Commission determines that such compatibility is no longer necessary; and
    - Wireless services and equipment capable of sending, receiving and displaying text must support specific RTT functions, features, and capabilities necessary to ensure that people with disabilities have accessible and effective text-based communications service.
- The Commission proposes establishing timelines for implementation of RTT as follows:
    - For Tier I wireless service providers, and manufacturers that provide devices for such services, implementation of RTT would be required by December 31, 2017.
    - For non-Tier I wireless providers, and manufacturers of equipment used with such services, the Commission seeks comment on an appropriate timeline for implementation of RTT.
- Finally, the Commission seeks comment on whether to amend its rules to place

comparable responsibilities to support RTT on providers and manufacturers of wireline IP services and equipment that enable consumers to initiate and receive communications by voice.

3. The Commission believes that the above proposals for the migration from TTY to RTT technology will ensure that people with disabilities can fully utilize and benefit from twenty-first century communications technologies as our nation migrates from legacy analog systems to IP-based networks and services. The Commission seeks comment on the tentative conclusions, proposals, and analyses put forth in document FCC 16-53, as well as on any alternative approaches.

Background

4. The Commission has adopted specific rules requiring support for TTY technology by providers and manufacturers of telecommunications and advanced communications services and devices. See 47 CFR 6.5, 7.5, 14.20, 14.21, 20.18(c), 64.601(a)(1), (b), 64.603, 64.604(a)(3)(v), (c)(5)(iii). On June 12, 2015, AT&T filed a petition requesting that the Commission initiate a rulemaking proceeding to authorize the substitution of RTT for TTY technology, as an accessibility solution for use with IP-based voice communications networks and services.

Limitations of TTY Technology and the Need for a Rulemaking

5. TTY technology was developed more than fifty years ago as a means of enabling people who are deaf, hard of hearing, and speech disabled to use the legacy Public Switched Telephone Network (PSTN). The record shows the significant challenges that TTY technology presents on IP-based communication networks and platforms, including its 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. These deficiencies can degrade quality, augment error rates, and hurt the reliability of telephone communications. When these shortcomings occur, synchronization of the conversation also can be impeded, and the transmission can become garbled until it is restored. For TTY users, this not only is frustrating, but also can present a

dangerous situation in an emergency, when effective communication is critical. TTYs are also criticized for their slow transmission speed, their dependency on turn-taking, their use of significant network bandwidth, their lack of interoperability with dedicated text devices used in other countries, and their limited character set, the latter of which can make communicating certain information, such as e-mail and web addresses, difficult or impossible.

6. The record shows that these technical and functional limitations of TTY technology have resulted in a steady decline in its use in favor of other forms of text communication that offer greater ease of use, improved features, and practicability. This trend is also revealed in a survey of the participants in field trials conducted to assess the user experience of the quality and interoperability of RTT and alternatives. Reports by the Interstate Telecommunications Relay Services (TRS) Fund Administrator, Rolka Loube, confirm decreasing reliance on TTYs; over the past 7½ years, its monthly filings show a drop of nearly 80 percent in the number of minutes attributed to TTY-initiated relay calls. Rolka Loube, TRS Fund Performance Status Report, http://www.rolkaloube.com/#!formsreport/c1zvl. TTYs are hardly ever used with wireless services. Instead, consumers have opted for applications that are native to the IP environment, such as short messaging services (SMS), instant messaging, email, IP Relay Service, and various social media applications.

7. Support for Commission action comes from the industry, the consumers, and the Commission's federal advisory bodies that have addressed this matter over the past several years. Most recently, in October 2015 and February 2016, the Commission's Disability Advisory Committee (DAC) submitted two sets of recommendations that support the Commission's exploration into the use of RTT or other text-based solutions as a replacement for TTY technology. Prior to this, in March 2013, the Commission's Emergency Access Advisory Committee (EAAC) recommended replacing TTY support requirements with requirements for direct access to 911 services via IP-based text communications that include real-time text.

Proposals for RTT Implementation

8. The Commission proposes to amend its rules to replace the rules governing the obligations of wireless providers and manufacturers to support TTY technology with rules defining the obligations of these entities to support RTT over IP-based wireless voice services. The Commission tentatively concludes that the technical and functional limitations of TTYs make this technology unsuitable as a long-term means to provide full and effective access to IP-based wireless telephone networks, and that there is a need to provide individuals who rely on text communication with a superior accessibility solution for the IP environment. The Commission further tentatively concludes that RTT can best achieve this goal because it can be well supported in the wireless IP environment, will facilitate emergency communications to 911 services, allows for more natural and simultaneous interactions on telephone calls, will largely eliminate the need to purchase specialized or assistive devices that connect to mainstream technology, and may reduce reliance on telecommunications relay services.

RTT Support by Wireless Providers and Manufacturers

Transmission of RTT over IP-based Wireless Services

9. To achieve an effective and timely transition to RTT, the Commission proposes to require RTT support at a specified time in the future, but also seeks comment on the extent to which there should be an interim period preceding such deadline, during which covered entities would be allowed to provide either RTT or TTY support on IP-based wireless services. The Commission believes that establishing an RTT requirement is necessary to ensure that people with disabilities continue to have effective access to wireless communications services as these services make the transition to an all-IP environment, and seeks comment on this approach. To this end, the Commission proposes the following revisions to its rules:

- Amend § 20.18(c) to require wireless IP-based voice service providers to be capable of transmitting 911 calls from individuals who are deaf, hard of hearing, deaf-blind, or speech disabled through RTT technology, in lieu of transmitting 911 calls from TTYs over IP networks;

- Amend part 64 to require wireless interconnected voice-over-IP (VoIP) service providers to support TRS access through RTT technology, including 711 abbreviated dialing access, in lieu of supporting TRS access via TTY technology;
- Amend parts 6 and 7 to require providers of wireless interconnected VoIP services subject to these rules to provide and support RTT, if readily achievable, in lieu of providing connectability and compatibility with TTYs; and
- Amend part 14 to require providers of wireless VoIP services subject to these rules to provide and support RTT, unless this requirement is not achievable, in lieu of providing connectability and compatibility with TTYs.

End User Device Support for RTT

10. The Commission believes that the availability of RTT-capable end user devices for users is essential in order to facilitate the use of RTT for emergency purposes, fully integrate RTT capability into the IP environment, and ensure that RTT users have the same range of device choices offered to the general public for voice communications. To this end, the Commission further proposes to amend its rules in the following manner to address the ability of wireless devices used by consumers to support RTT.

11. Wireless service providers. For providers of IP-based voice services, the Commission proposes to:

- Amend § 20.18(c), which requires the transmission of 911 calls from TTYs, and parts 6, 7, and 14 to require that, to the extent a wireless provider issues design specifications, purchases for resale to users, or otherwise authorizes new handsets or other text-capable end user devices for use with its IP-based voice services, the provider shall ensure that such devices have the ability to send, receive and display RTT.
- If it is not readily achievable (under parts 6 and 7) or achievable (under part 14) to incorporate RTT capability within such wireless devices, the wireless provider shall

ensure that such devices are compatible with RTT-equipped stand-alone devices or software applications, "if readily achievable" for equipment subject to parts 6 and 7 of the rules, and "unless not achievable" for equipment subject to part 14 of the rules.

12. Manufacturers. For manufacturers of wireless handsets or other wireless text-capable end user devices used with IP-based voice services, the Commission proposes to amend parts 6, 7, and 14 to require such manufacturers to:

- Ensure that their devices have the ability to send, receive, and display RTT, if readily achievable for equipment subject to parts 6 and 7 of the rules, and unless not achievable for equipment subject to part 14.
- If it is not readily achievable (under parts 6 and 7) or achievable (under part 14) to incorporate RTT capability within such devices, ensure that such devices are compatible with RTT-equipped stand-alone devices or software applications, if readily achievable for equipment subject to parts 6 and 7 of the rules, and unless not achievable for equipment subject to part 14 of the rules.

13. The Commission's proposal to create an affirmative requirement for RTT support is consistent with past Commission actions and Congressional mandates to ensure that, as communications networks evolve to incorporate new technologies, accessibility safeguards be amended to ensure that people with disabilities continue to have effective access to communications. The purpose of section 716, added to the Communications Act of 1934, as amended (Act), by the Twenty-First Century Communications and Video Accessibility Act of 2010 (CVAA), Pub. L. No. 111-260, 124 Stat. 2751 (October 8, 2010), is to ensure that "advanced communications services" (ACS) that incorporate new technologies are accessible to individuals with disabilities. 47 U.S.C. 617(a)(1) (emphasis added). As explained by the Senate committee report on the CVAA, the CVAA's purpose is "to update the communications laws" to ensure accessibility, because, since the previous update in 1996 (when section 255 of the Act was added), "[i]nternet-based and digital technologies are now pervasive . . . [and] the extraordinary

benefits of these technological advances are sometimes not accessible to individuals with disabilities." S. Rep. No. 111-386 at 1-2 (2010). Thus, for example, section 716(d) of the Act expressly prohibits ACS providers from "install[ing] network features, functions or capabilities that impede accessibility or usability." 47 U.S.C. 617(d). By requiring wireless providers and manufacturers, as they deploy IP-based voice services, equipment, and networks, to implement RTT as a state-of-the-art accessibility technology, the Commission will ensure not only that such networks do not impede accessibility, but that the benefits of technological advances are accessible to individuals with disabilities as Congress intended.

14. The Commission's proposals are also intended to avoid repetition of past failures to build in accessibility at the outset of technological changes, which led to long delays in providing access to new communications technologies for people with disabilities. For example, in the mid-1990s, despite the public safety dangers of leaving people with disabilities behind as the wireless industry made its transition from analog to digital technology, repeated delays resulted in the lack of access to digital wireless services by TTY users for over six years, well past the rise in popularity of digital technology with the general public. Similarly, it was not until 2005 that digital handsets began integrating hearing aid compatibility, again despite the introduction of these handsets in the mid-1990s. Each of these delays imposed considerable hardships on people with disabilities, who remained without digital wireless access – and without emergency access via wireless networks – for lengthy periods of time after these technologies became available to everyone else. Additionally, industry efforts that were needed to eventually achieve such access – which took place very late in the design and development process of building of such phones – proved more costly and burdensome than would likely have been the case had accessibility been incorporated from the outset.

15. The Commission has noted that communication networks are rapidly transitioning away from the historic provision of time-division multiplexed (TDM) services running on copper to new, all-IP multimedia networks using copper, co-axial cable, wireless, and fiber as physical

infrastructure. As these changes take place, the Commission seeks to ensure that its accessibility rules for IP-based voice networks achieve the early integration of accessibility features, so that people with disabilities can enjoy communications services as they emerge, along with the general population. The Commission believes that amending its rules to require support of RTT at this time is likely to create greater certainty for companies that have expressed an interest in deploying RTT, and provide a supportive regulatory landscape in which to do so. With the action taken today, the Commission expects that covered entities will have the necessary incentives to invest and innovate to improve products employing RTT functionalities, promoting more effective access to 911 services and other communications for individuals with disabilities.

16. The Commission seeks comment on its tentative conclusions, proposals, and analysis, including the costs and technical feasibility of the proposed rule amendments, and on any proposed alternatives. The Commission notes that in its text-to-911 proceeding, it determined that significant benefits could be attained by enabling people with disabilities to use text to access emergency services by phone. The Commission has recognized that as our nation ages, the number of Americans who may need alternatives to voice telephone communications is likely to increase. The Commission believes that establishing a requirement to ensure that RTT is incorporated in wireless IP-based services and devices as these are designed and developed will reduce the overall costs of incorporating this access feature, while ensuring that people with disabilities are not left behind in the transition to new technology. The Commission seeks comment on whether these assumptions are correct and generally on the benefits to be derived from incorporating RTT functionalities into wireless services and end user devices, including the benefits that may accrue for improving access to 911 services.

17. In a joint filing, three technology research centers, the Rehabilitation Engineering Research Center on Telecommunications Access, Trace Research & Development Center at the University of Wisconsin-Madison, and the Gallaudet University Technology Access Program (Technology Research Centers), contend that the implementation of RTT would not add any

hardware costs to support RTT, if limited to products used for receiving and displaying RTT that already have a display large enough to display multiple lines of text (or software designed to run on a multi-line display) and a mechanism for generating text for other purposes. They and others point out that many Internet-enabled terminal devices, including smartphones, tablets, and VoIP desk phones, already have such text generation and display capabilities. Costs also appear to be minimized if incorporated in the beginning of the design process. The Commission seeks comment on the merits of these assumptions, and on how they would be affected by the outcome of the issues raised for comment in this section regarding the scope of an equipment capabilities requirement.

Timelines

18. Larger wireless carriers. The Commission seeks comment on when its rules requiring implementation of RTT should become effective. The Commission proposes that this be completed by Tier I wireless service providers, which offer nationwide service, no later than December 31, 2017. See 47 CFR 20.19(a)(3)(v) for a definition of Tier I providers. The Commission seeks comment on whether the proposed date will afford sufficient time for this category of providers to achieve compliance with the rules proposed in document FCC 16-53. Alternatively, the Commission seeks comment on whether it would be preferable to establish a specified interim period of time – prior to the deadline set for an RTT requirement – during which Tier I covered entities would be allowed to support RTT over their IP facilities if they are unable to support TTYs. The Commission asks parties that believe such interim period is necessary to explain whether and how such period would be needed to afford additional flexibility during the transition to RTT technology. The Commission further asks commenters who disagree with the Commission's proposed deadline of December 31, 2017, for Tier I carriers to explain why additional time would be needed to achieve deployment of RTT.

19. Smaller wireless carriers. The Commission proposes that smaller wireless carriers, to be defined as those that do not fall into Tier I, be given an additional period of time to achieve

compliance with the proposed RTT support requirements beyond the deployment date proposed for the larger, Tier I carriers. The Commission seeks comment on what would be an appropriate extension of time, as well as whether the Commission should distinguish between Tier II (non-nationwide mid-sized commercial mobile radio service (CMRS) providers with greater than 500,000 subscribers) and Tier III carriers (non-nationwide small CMRS providers with no more than 500,000 subscribers) in determining appropriate benchmarks for these providers. Alternatively, the Commission seeks comment on whether it would be more appropriate to tie the obligations of these carriers to the timing of their transition to IP-based wireless technologies, such as IMS/VoLTE or 4G services. Finally, to what extent would it be appropriate to establish an interim transitional period, akin to what is discussed above for Tier I carriers, during which such smaller carriers would be allowed, but not required, to support RTT in lieu of TTY technology?

20. End user devices. The Commission proposes that the timeline established for RTT support over IP-based wireless services apply as well to handsets and other text-capable end user devices for use with such services, and thus proposes that any such handsets or devices sold after December 31, 2017, have RTT capability, and seeks comment on this proposal. Making this requirement effective at the same time that wireless services are required to become RTT-capable would ensure that sufficient handsets are available for people with disabilities to have access to text communications in real time after the existing orders waiving service provider requirements for TTY support expire. Will the proposed December 2017 deadline for the Tier I service providers allow sufficient time to incorporate RTT capability in end user devices? Is it more appropriate for the deadline established for end user devices to apply to the date on which new devices are manufactured, rather than first made available to the general public?

21. In addition to requiring the inclusion of RTT support on new terminal devices, consistent with statutory requirements for telecommunications access and access to advanced communications services and equipment, should there be a requirement to add RTT capability to

end user devices already in service at the compliance deadline, at "natural opportunities," previously defined by the Commission to occur 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? Further, to the extent that it is not achievable under section 716 of the Act or readily achievable under section 255 of the Act to make an end user device accessible through RTT, by what date should such device be made compatible with a stand-alone RTT device or app to the extent that these become available?

22. The Commission also seeks comment on the period of time, if any, that over-the-top applications or plug-ins for RTT should be permitted as an interim measure to achieve RTT on end user devices, and if permitted as over-the-top applications, whether manufacturers and service providers should be required to pre-install such applications on devices before they are sold to the public. Specifically, the Commission proposes that the use of an over-the-top application as an interim solution, such as that which AT&T is achieving, will be sufficient to constitute compliance with the RTT requirement by December 31, 2017, and seeks comment on this tentative conclusion. At the same time, the Commission asks to what extent the Commission should be concerned that the many advantages of RTT as a universal text solution will not be achieved until RTT is incorporated as a native function in end user devices, or at a minimum, pre-installed by the manufacturer or service provider as a "default" application. The Commission seeks comment on whether this concern should guide its final rules, and further seeks comment on what functionalities of RTT, and what associated benefits of RTT, if any, would be unavailable if it is initially implemented as an over-the-top application rather than as native functionality. With this in mind, the Commission asks commenters to provide specific parameters for and factual showings justifying any timelines they propose for transitioning to native RTT functionality in covered devices.

Advantages of RTT

23. IP-Based Technology. There is general agreement among AT&T and those commenting on its petition that RTT is an effective alternative to TTY technology for the IP environment. Commenters concur that RTT is designed for today's packet-switching environment and offers an expanded array of features to enable more robust user conversations, including real-time editing of text and full-duplex functionality (i.e., both parties can communicate simultaneously). Various commenters state that RTT allows for the intermixing of speech with text, is more spectrally efficient than TTY, will be superior to TTY in every way – transmission speed, latency, reliability, features, privacy, conversation form, and ease of use – will facilitate the transition to end-to-end Next Generation 911 (NG911), and will meet the needs of legacy TTY users during the transition. The Commission tentatively concludes that deployment of RTT on IP networks will offer functionality greatly superior to that of TTY technology, and it seeks comment on this tentative conclusion.

24. Off-the-Shelf Devices. Commenters also state that RTT will allow consumers with disabilities to make calls using the built-in functionality of a wide selection of off-the-shelf devices, including smartphones, tablets, computers and other Internet-enabled devices that have the ability to send, receive, and display text. These parties point out that this can eliminate the high costs and other challenges involved in finding, purchasing, and making effective use of assistive devices such as TTYs. The Commission tentatively concludes that the ability to acquire off-the-shelf RTT-capable devices will be beneficial for text communication users, and seeks comment on this tentative conclusion.

25. Substitution for Telecommunications Relay Services. Section 225 of the Act directs the Commission to ensure that TRS is available "in the most efficient manner." 47 U.S.C. 225(b)(1). The record suggests that, because RTT will provide greater opportunities for direct, point-to-point text communication and can enable text to be intermixed with voice, it can reduce reliance on relay services and thereby provide consumers with greater privacy and independence, while reducing overall costs for telecommunications users. For example, one form of TRS, captioned

telephone relay service (CTS), currently uses communication assistants (CAs) to enable people who are hard of hearing to receive captions of conversation spoken by other parties to a telephone call. The Commission expects that RTT users might not need these services if they were able to receive RTT over VoIP phones to supplement incoming voice conversations for difficult-to-understand words. Similarly, the Commission predicts that people with speech disabilities who can type will be able to use standard phones capable of generating RTT to communicate with other persons who also have VoIP phones with displays. However, the Commission notes that these results are likely to be achieved only to the extent that RTT capabilities in end user devices truly become ubiquitous – i.e., are enabled by default in all or most wireless (and eventually wireline) terminal equipment. To the extent that RTT is "supported" but not fully incorporated as a native or default function of devices – and is merely available for users to download or install – commenters suggest that the universal reach of text as a substitute for relay services will be less likely to be achieved, because many individuals who do not rely on text may not install this extra functionality. The Commission seeks comment on whether these assumptions are correct.

26. Improvement of Telecommunications Relay Services. In addition to substituting for TRS in some circumstances, the Commission believes that RTT can be used to enhance the ability of TRS to provide functionally equivalent telephone service. For example, it would appear that for text-based forms of TRS, RTT can improve the speed and reliability of communications in an IP environment. The Technology Research Centers further note that individuals may be able to use RTT to supplement communications in sign language with text during video relay service (VRS) calls, reducing the time needed for CAs to convey detailed information, such as addresses and URLs. The Commission seeks comment on these assertions and whether there are other ways that RTT can improve the provision of TRS for its users.

27. Advantages Over Messaging-Type Services. Text-based accessibility solutions include RTT, SMS, instant messaging and similar chat-type functions, and e-mail. With the exception of RTT, each of these technologies requires parties to complete their messages and to press "send,"

"enter," or a similar key to transmit the message to its recipient. By contrast, when a message is sent in real time, it is immediately conveyed to and received by the call recipient as it is being composed. Several commenters maintain that RTT is the only type of text communication that allows a natural flow of conversation akin to voice telephone calls, and therefore the only form that meets the criterion of functional equivalency. Without the turn-taking and delays characteristic of messaging-type communications, these parties state, RTT gives call recipients "an opportunity to follow the thoughts of the sender as they are formed into words." The Technology Research Centers note what they consider additional drawbacks of these alternatives: the delivery of messages over SMS is not guaranteed; instant messaging is not interoperable; and certain features, such as conference calling, are not available via instant messaging across multiple providers.

28. Access to 911 Emergency Services. Perhaps the most compelling case to be made in favor of RTT over messaging-type services is in the context of emergency calls to 911. Recent studies reveal a preference for RTT in simulated emergency situations by 100 percent of participants. According to the Technology Research Centers, a principal reason for preferring RTT over SMS is that the latter can result in "[c]rossed messages [that] can lead to misunderstanding and loss of time. . . . In an emergency situation, a panicked caller may ask a second or third question if there is no immediate visible response from the 9-1-1 call-taker. This can lead to confusion, crossed answers, and error." In contrast, these groups explain, RTT enables "emergency call-takers [to] view the message as it is being typed and respond, refer, interrupt, or guide the information being sent to speed up communication and make it more helpful to emergency responders." In this manner, they say, RTT "allows for the efficient exchange of information and a continued sense of contact," as well as the delivery of even incomplete messages, which can result in potentially saving lives in an emergency.

29. The Commission recognizes that, two years ago, it adopted rules that could be met through the provision of SMS-based text-to-911 service. The Commission's goal in doing so was

to ensure that, in the near term, individuals have a direct and familiar means of contacting 911 via text through mass market communication devices that are already available to people with disabilities and other members of the general public. The Commission noted that some commenters were less supportive of SMS-to-911 because it does not support the ability to "send and receive text simultaneously with the time that it is typed without having to press a 'send' key." At the same time, the Commission recognized that many stakeholders would choose to text to 911 through an interim SMS-based solution because of its ease of use for people with disabilities and ubiquity in mainstream society. It went on to note that RTT "provides an instantaneous exchange, character by character or word by word," a feature that commenters to this proceeding say is critical in an emergency. The record in the instant proceeding continues to reflect major concerns by several commenters about using SMS as a long term 911 accessibility solution. While the Commission does not propose to make any changes to its existing text-to-911 rules in this proceeding, it believes that its proposals to facilitate the wider availability of RTT for people with disabilities could have a beneficial impact on the future evolution of text-to-911.

30. The Commission proposes that RTT will be more effective than messaging-type services in meeting the communication needs of consumers with disabilities, including their emergency communication needs, and seeks comment on this proposal. Are there other text-based communication solutions that can meet the general communication needs of this population as effectively as RTT, and if so, how? How would the deployment of RTT or other text-based solutions impact the transition to NG911? The Commission asks commenters to address concerns about the costs, benefits, and feasibility of using RTT for accessing 911 services, and seeks comment on the technical and operational impact on Public Safety Answering Points (PSAPs) receiving RTT-based 911 calls.

Minimum Functionalities of RTT

31. The DAC recommends that the Commission "consider how telecommunication and advanced communications services and equipment that support RTT [can] provide the users of

RTT (either in isolation or in conjunction with other media) with access to the same telecommunication and advanced communications functions and features that are provided to voice-based users of the services and equipment." The Commission believes that this formulation captures the objectives of sections 225, 255, and 716 of the Act, which are to provide functionally equivalent communications and to ensure that telecommunications and ACS are fully accessible to and usable by people with disabilities. The Commission proposes that, in amending its rules to recognize IP-based text alternatives and facilitate the transition away from TTY technology, the Commission should consider the extent to which RTT's features, functions, and capabilities can provide people with disabilities with telephone service that is as accessible, usable, and otherwise as effective as voice-based services over IP networks. The Commission seeks comment on this proposed approach.

32. The Commission tentatively concludes, proposes, or seeks comment on the following basic functionalities that it believes are necessary for a wireless provider's implementation of RTT to be considered compliant with the rules adopted by the Commission in this proceeding. The Commission seeks comment on the extent to which each is necessary to achieve effective telephone access for individuals with disabilities, as well as its costs, other benefits, and any technical or other challenges that may be associated with its provision. Finally, the Commission seeks comment on the extent to which each of these features will be enabled or facilitated through the use of RFC 4103. RFC 4103, http://www.ietf.org/rfc/rfc4103.txt.

Interoperability

33. The Commission tentatively concludes that people who rely on text to communicate can only achieve effective RTT communications across multiple platforms and networks if the communication transmissions carried across, and the terminal equipment used with, those platforms and networks are interoperable with one another. The Commission seeks comment on this tentative conclusion. The Commission notes that there is consensus among commenters on AT&T's petition for rulemaking with respect to the need for seamless interconnection of RTT

services across networks, service providers, and devices. Virtually all commenters agree with AT&T on the importance of not locking users into a single network, service provider, or device, as well as the value of ensuring that people with disabilities have the same kinds of choices in a competitive market as the population in general. Some commenters note that if service providers were to adopt proprietary standards that do not interoperate, RTT users might not be able to communicate with other users in emergency situations.

34. Commission rules reflect a longstanding commitment to policies favoring the openness of telecommunications services across providers and devices, so that anyone can make a voice call to anyone else, regardless of the provider or device they are using. For example, the Commission has promulgated a series of rules to ensure the interconnection of terminal equipment to the telephone network. The Commission's rules also prohibit telecommunications carriers and ACS providers from installing network features, functions, or capabilities that impede the accessibility or usability of telecommunications and ACS services. Further, in the Emerging Wireline Order and Further Notice, the Commission tentatively concluded that a carrier seeking to discontinue an existing retail communications service in order to transition to a newer technology must demonstrate that the replacement service offered by that carrier, or alternative services available from other providers in the affected service area, provides voice and non-voice device and service interoperability – including interoperability with third party services – as much as or more than the interoperability provided by the service to be retired. Technology Transitions, Report and Order, Order on Reconsideration, and Further Notice of Proposed Rulemaking, published at 80 FR 63321, October 19, 2015 (Emerging Wireline Order and Further Notice). The Commission believes that preserving interoperability is equally important in the transition from TTY to RTT technology. The Commission further believes that, in the absence of interoperability, multiple versions of RTT may need to be supported, not only by user devices, but also by TRS call centers and 911 PSAPs – a burden that could entail a prohibitive expense for many such entities. The Commission seeks comment on this analysis.

35. RFC 4103 as a Safe Harbor RTT StandardThe Commission next considers how best to achieve RTT interoperability across communication platforms, networks, and devices. Some commenters maintain that having a single standard will ensure that RTT is a valuable and universally usable communications medium and that it will be less expensive for carriers to develop and deploy a single, interoperable RTT system now, than to each develop their own versions of RTT service and later try to reconfigure these to be interoperable. Various commenters point out that the lack of a common standard sometimes has impeded the interoperability of communications technologies needed by people with disabilities, reporting that the lack of an international standard for TTY technology has prevented TTY users from communicating by text in real-time with people living or visiting countries abroad, the lack of a common standard for instant messaging sometimes prevents instant messaging users from being able to contact each other across platforms, and the lack of a common VRS standard has impeded full interconnection for users of this service since the early 2000s.

36. The Commission agrees with consumers and researchers that standards can be especially important to ensuring interoperability of technologies needed by people with disabilities, and that common technical specifications will allow connectivity to occur seamlessly from one end of the call to the other without incurring obstacles along the way. At the same time, the Commission acknowledges the need for its rules to incorporate "key principles of flexibility and technology neutrality" as recommended by industry commenters. The Commission tentatively concludes that a middle ground between these two approaches can be achieved by referencing a technical standard as a safe harbor. The Commission believes that this approach will ensure RTT interoperability and product portability, while at the same time providing sufficient flexibility for covered entities adhering to different internal RTT standards – so long as their RTT support offers the same functions and capabilities as the selected standard, and is interoperable with the standard's format where they connect with other providers. The Commission seeks comment on this tentative conclusion and analysis.

37. To the extent that any commenter believes that reference to a safe harbor standard is unnecessary, the Commission seeks comment on how it can otherwise ensure that RTT communications are interoperable, not just among different implementations of RTT, but also with legacy interconnected TTY devices. Likewise, the Commission asks commenters who support adoption of a mandatory technical standard to explain why a safe harbor, combined with performance objectives, would be insufficient to achieve effective and interoperable RTT communications. Further, will a safe harbor be sufficient to provide incentives for manufacturers and providers to invest in research and development of RTT functionalities?

38. For the reasons discussed below, the Commission tentatively concludes that RFC 4103 is the appropriate standard to which covered entities should adhere as a safe harbor, conformity with which should be deemed to satisfy the Commission's interoperability requirements and certain of the Commission's performance objectives for RTT communications. The Commission seeks comment on this tentative conclusion. Use of RFC 4103 for RTT communications is well supported by the record to date. First, RFC 4103 is a non-proprietary, freely available standard that has been widely referenced by leading standards organizations. This standard, developed by the IETF, has been adopted by the International Telecommunications Union Telecommunication Standardization Sector, the European Telecommunications Standards Institute, 3rd Generation Partnership Project, a partnership of seven telecommunications standards organizations (3GPP), and Groupe Speciale Mobile Association.

39. Second, RFC 4103 is already being used or has been widely designated for implementation by numerous carriers and other organizations, both domestic and foreign. Domestically, both AT&T and Verizon have specified RFC 4103 as the standard protocol to be implemented in their IP-based wireless networks as the successor to TTY technology, the National Emergency Number Association has specified RFC 4103 for interoperable use in IP-based Next Generation emergency text communications where Session Initiation Protocol (SIP) technology is used, and the Access Board has proposed requiring RFC 4103 for federal

procurements associated with the transmission of SIP-based RTT to achieve compliance with section 508 of the Rehabilitation Act. In addition, RFC 4103 is specified in the SIP Forum's interoperability profile for VRS providers. Some commenters note that outside the United States, RFC 4103 has been implemented in text or video relay services in France, the Netherlands, Sweden, and Norway.

40. Third, according to commenters, RFC 4103 has a number of features that make it particularly suitable for RTT. According to the Technology Research Centers, RFC 4103 eliminates the need to transcode at the borders of a network, permits a wide range of hardware, supports the international character set (Unicode), has built-in redundancy, is bandwidth efficient, is based on the same transmission protocol (RTP) as audio and video, and is supported by existing open source and commercial codecs. The Commission seeks comment on the value of each of these features and the extent to which they can contribute to making RFC 4103 a feasible and flexible means of achieving RTT interoperability and functionality. The Commission also seeks comment on which of the user functionalities necessary to an effective communications system, in addition to interoperability, can be made possible with adherence to RFC 4103. Further, to what extent can other RTT standards "coexist" with RFC 4103 in networks, technologies, and terminal equipment on which RTT is being used, to allow RTT to provide a universally accessible communications environment for people who are deaf, hard of hearing, speech disabled, or deaf-blind?

41. Next, the Commission seeks comment on whether RFC 4103 is sufficiently flexible to spur innovation in accessibility solutions. Are there any non-SIP-based networks for which implementation of RTT would serve the public interest, and if so, how could RTT be implemented on such networks so as to be interoperable with networks adhering to RFC 4103? Finally, if any adverse effects would result from adopting RFC 4103 as a safe harbor, the Commission asks commenters to identify these, and to explain specifically how such effects could be mitigated by modifying the standard or allowing an alternative protocol.

42. In the event that the Commission decides to adopt RFC 4103 as a safe harbor for RTT, the Commission seeks comment on how this standard can be updated and amended to accommodate successor non-proprietary RTT technologies that are developed in the future. The Technology Research Centers point out that the path for incorporating innovations into RTT can be the same as that used to update voice standards and codecs, i.e., by phasing in new formats and technologies while continuing to support the existing technology until its retirement. How can the Commission design its rules to allow these capabilities to continue evolving with technological advances and ensure the flexibility requested by industry, while not compromising the effectiveness of this technology for people with disabilities?

43. The Commission believes that it has sufficient authority to adopt RFC 4103 as a safe harbor. Section 716 of the Act explicitly allows the Commission to "adopt technical standards as a safe harbor for such compliance if necessary to facilitate the manufacturers' and service providers' compliance with section [716](a) through (c) of the Act." 47 U.S.C. 617(e)(1)(D). Additionally, section 106 of the CVAA expressly authorizes the Commission "to promulgate regulations to implement the recommendations proposed by the EAAC, as well as any other 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." 47 U.S.C. 615c(g) (emphasis added). The Commission seeks comment on this analysis. Further, the Commission asks commenters who support a mandatory standard to provide legal authority for their proposal. CTIA – The Wireless Association points out that section 716 of the Act does not permit the Commission's regulations implementing that section to mandate technological standards, except as a safe harbor to facilitate the manufacturers' and service providers' compliance with section 716 of the Act. At the same time, as noted, section 106 of the CVAA expressly authorizes the Commission to adopt technical standards to ensure access by people with disabilities to an IP-based emergency network. In the event that the Commission deems it

necessary to adopt a mandatory RTT standard, would the Commission's specific standard-setting authority under section 106 of the CVAA, as well as its authority under 47 U.S.C. 225(d), provide sufficient authority for the Commission to establish a mandatory technical standard for RTT, notwithstanding the standard-setting restriction of section 716 of the Act?

Backward Compatibility with TTY Technology

44. The DAC points out that while TTY usage continues to be in steady decline, some people who are deaf, hard of hearing, deaf-blind, or speech disabled, including senior citizens and rural residents, continue to rely on TTYs. In order to ensure that TTY-reliant consumers continue to have a method of communicating during the transition to RTT technology, the Commission proposes that, to comply with the rules adopted in this proceeding, wireless service providers must ensure that their RTT technology is interoperable with TTY technology. The Commission seeks comment on this proposal. Among other things, with this requirement, the Commission believes it will remain possible for consumers to use their TTYs to communicate with a TRS call center that is set up to receive RTT calls and for consumers who use RTT technology to communicate with a TRS call center that is set up to provide traditional TTY-based TRS. The Commission seeks confirmation on whether it is feasible to use gateways and RFC 4103 to achieve backward compatibility, as proposed by the Technology Research Centers, and if not, how transcoding between RTT packets used with IP-based services and TTY Baudot tones can be achieved, in accordance with the accuracy criteria the Commission proposes for RTT. Is it correct that such interoperability can be achieved without added costs to TTY users and PSAPs as suggested by AT&T? The Commission asks commenters to discuss the costs, benefits, and technical feasibility of using any alternative standards for this purpose.

45. A particular concern regarding backward compatibility with TTYs is the fact that TTYs can only send and display a small subset of Unicode characters, namely upper-case letters, numbers, the pound and dollar signs, and some punctuation marks. Thus, gateways between RTT systems and legacy TTYs need to be able to convert the much larger Unicode set used with RTT

into readable TTY characters. In general, such character conversion is called "transliteration." Thus, accented characters may be rendered as multiple characters – e.g., "ä (a umlaut)" may become "AE." In some cases, words must be used in the transliteration, but all Unicode characters can be described unambiguously, if necessary, by their Unicode character name. According to the Unicode Consortium, transliterations should be standard, complete, predictable, pronounceable, and reversible. See Unicode Common Locale Data Repository, http://cldr.unicode.org/index/cldr-spec/transliteration-guidelines. Should the rules require a standard transliteration approach or standard table, or should each entity responsible for offering gateways between RTT and TTY choose its own transliteration approach? What standards should be referenced? If each gateway may choose its own transliteration approach, should it meet, for example, the general transliteration guidelines formulated by the Unicode Consortium or other standards body? Should there be a standard indicator that a character string is a Unicode emoji, e.g., "(* GOLFER *)" for Unicode U+1F3CC? With respect to PSAPs employing TTYs, what impact might transliteration have on PSAPs' ability to handle the RTT 911 call?

46. The Commission also seeks comment on whether there are other assistive devices used with the PSTN, such as Braille-capable devices used by people who are deaf-blind, that would require or benefit from backward compatibility, and what additional steps are necessary to achieve this, beyond the steps necessary to achieve backward compatibility for TTYs.

47. Finally, the Commission seeks comment on what events or measures should trigger a sunset of the residual obligation for wireless networks to be backward compatible with TTY technology. In the CVAA, Congress explicitly asked the EAAC to consider "the possible phase out of the use of current-generation TTY technology to the extent that this technology is replaced with more effective and efficient technologies and methods to enable access to emergency services by individuals with disabilities." 47 U.S.C. 615c(c)(6). The EAAC recommended against "imposing any deadline for phasing out TTY at the PSAPs until the analog phone system (PSTN) no longer exists, either as the backbone or as peripheral analog legs, unless ALL legs trap

and convert TTY to IP real-time text and maintain [Voice Carry Over (VCO)] capability." Since then, however, the DAC has requested the Commission to "consider a TTY sunset period when declining wireline TTY minutes reaches a certain threshold to be determined, while addressing the needs of people who are deaf-blind, speech disabled, and have cognitive impairments as well as for relay services and rural access."

48. The Commission notes that the NG911 Now Coalition has set a goal of transitioning to nationwide NG911 by the end of 2020. See NG911 Now Coalition, http://www.ng911now.org/#about. The Commission seeks comment on whether this is an appropriate benchmark for terminating the requirement for backward compatibility, or whether a different indicator should be used to make this determination. Would it be more appropriate for the Commission to set the end date based on TTY usage falling below a threshold level? If the latter, should TTY usage be assessed based on usage of TTY-based forms of TRS, or a different indicator? The Commission is concerned about ensuring that people with disabilities continue to have a means of using text to make emergency and non-emergency calls after a TTY phase-out and generally seeks comment on safeguards needed to address these communications needs.

Other RTT Functionalities for Wireless Services

49. In addition to ensuring interoperability, in this section the Commission seeks comment on a number of other features and capabilities that it believes will be necessary to ensure that RTT is as accessible, usable, and effective for people with disabilities as voice telephone wireless service is for people without disabilities.

Initiation of Calls Using RTT

50. As a preliminary matter, the Commission proposes that wireless service providers and manufacturers be required to configure their networks and devices so that RTT communications can be initiated and received to and from the same telephone number that can be used to initiate and receive voice communications on a given terminal device. Among other things, the Commission tentatively concludes that enabling access to ten digit telephone 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. The Commission tentatively concludes that a similar ability is an essential part of the provision of RTT, and seeks comment on this tentative conclusion and proposal, including its costs, benefits and technical feasibility.

Support for 911 Emergency Communications

51. As the Commission has previously stated, "[t]he ability of consumers to contact 911 and reach the appropriate PSAP and for the PSAP to receive accurate location information for the caller is of the utmost importance." Emerging Wireline Order and Further Notice. The Commission proposes that the implementation of RTT in IP networks must be capable of transmitting and receiving RTT communications to and from any 911 PSAP served by the network in a manner that fully complies with all applicable 911 rules, and seeks comment on this proposal. Are specific measures or rule amendments necessary to ensure that RTT supports legacy 911, text-to-911, and NG 911 services? Given that RTT is in an all-IP environment, and that there may be outages during a loss of commercial power, or RTT may be unavailable due to the limited battery backup inherent in IP-based equipment, are there additional ways to ensure continued access to emergency communications in the event of a power failure to the same extent this will be guaranteed for voice telephone users?

Latency and Error Rate of Text Transmittal

52. Based on comments in the record, the Commission proposes that compliant RTT must 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. To achieve this, the Commission further proposes requiring that RTT characters be transmitted within one second of when they are generated, with no more than 0.2 percent character error rate, which equates to approximately a one percent word error rate. The Commission believes that this will allow text to appear character-by-character on the recipient's display while the sender is typing it, with a point-to-point transmission latency that is no greater than that provided for voice communication. The

Commission seeks comment on these proposals, as well as whether the Commission should adopt other measures regarding the latency and error rate for RTT. For example, is it feasible, and necessary for effective communication, to provide users with the ability to edit individual characters or groups of words in real-time – for example, by backspacing and retyping?

53. The Commission also notes that, according to the Technology Research Centers, any RTT system also can be programmed to first receive and hold the sender's communication while it is being composed, and to then send the entire message together when triggered to do so, in a manner akin to instant messaging. Is this "block mode" feature desirable for certain individuals? For example, would it alert people who are deaf-blind to incoming messages so that they know when it is appropriate to respond? If so, should the Commission allow or require that this capability be made available on compliant RTT technology? If such a feature is permitted or required, should the Commission require nevertheless that RTT service revert to the character-by-character mode when 911 calls are detected by the IP network, in order to ensure the rapid exchange of information during such calls?

54. The Commission seeks comment on any other relevant considerations pertaining to the transmission and delivery of RTT that may affect its utility and effectiveness for people with communication disabilities.

Simultaneous voice and text capabilities

55. The Commission proposes to require that, for a manufacturer's or service provider's implementation of RTT to be considered compliant with the rules the Commission adopts in this proceeding, users of RTT must be able to send and receive both text and voice simultaneously in both directions over IP on the same call and via a single device. The Commission seeks comment on this proposal.

56. According to the 3GPP Technical Specification for Global Text Telephony, which is cited by the DAC, RTT that is implemented under RFC 4103 allows text to be transported alone or in combination with other media, such as voice and video, in the same call session. The DAC

therefore asks the Commission to consider "whether telecommunication and advanced communications systems can support the use of RTT simultaneously in conjunction with the other Real-Time media supported by the system." The DAC also recommends that the Commission consider whether RTT equipment and services should support, among other features, the user's ability to "intermix voice and text on the same call, including, for example, 'Voice Carry Over' and 'Hearing Carry Over.'" Such "carry over" modes currently are available as types of TRS. VCO allows people who are deaf and hard of hearing to use their own voices (where possible) and receive text back during a captioned telephone or TTY-based relay call, while HCO generally allows people with speech disabilities on speech-to-speech relay calls to hear directly what the other party says and use the CA to repeat what the person with the speech disability says. However, in an RTT network, can these features also serve as a mode of direct point-to-point communications, reducing the need for reliance on TRS?

57. A coalition of consumer groups points out that simultaneous voice and text on the same call also would allow callers to initiate a call using either text or voice and to switch to the other mode at any time during the call. Users would be able to send text in one direction and speech in the other, speak in parallel with text for captioned telephony, and supplement speech for difficult-to-hear words, addresses, and numbers. Others report findings that the quality, intelligibility, speed, and flow of communications improve when text is added to voice. Finally, the Technology Research Centers point out that the ability to use synchronized voice and text transmissions can improve communications on TRS calls. The Commission seeks comment on these assertions and the extent to which synchronized voice and text transmission is necessary for effective communication via RTT.

RTT with video and other media

58. Next, the Commission seeks comment on whether to require that, where covered service providers support the transmission of other media, such as video and data, simultaneously with voice, they also provide the capability for the simultaneous transmission of RTT and such other

media. The Commission notes that in studies conducted by the Technology Research Centers, participants generally expressed the desire to add video to RTT calls, "to express feelings, and to provide for more natural communication with sign language and the possibility of lip reading." In addition, some commenters highlight the benefits that multimedia capabilities can have in the TRS context, including the ability to supplement sign language communications with text on video relay calls. By enabling voice, text, and video to be delivered to users so that each of these types of media can be available at the same time, over the same call session, some parties also state that RTT can reduce overall reliance on TRS and also reduce or eliminate the need for TRS users to acquire the dedicated terminal equipment that is often needed to access these services. They claim that increasingly, people with and without disabilities would be able to converse with each other directly, using whichever mode of communication – voice, text, or video – is most suitable for getting their messages across.

59. To what extent is requiring such multimedia capabilities necessary to achieve telephone communications for text users that are as effective as those available to voice users? To what extent can such capabilities enhance the accuracy and speed of TRS or reduce overall reliance on conventionally defined forms of TRS, to ensure that TRS is available "in the most efficient manner"? 47 U.S.C. 225(b)(1). Would the inclusion of video capability with RTT be likely to lead to congestion problems, and how could such congestion be prevented or alleviated? For example, if simultaneous voice, RTT, and video are all available over the same telephone connection, could the parties to the call better simulate an in-person communication, which can be supplemented with RTT as needed, and thereby eliminate the need for a CA to serve as a communications bridge between the parties?

Requirements for TRS providers

60. The Commission generally seeks comment on how to integrate RTT into the provision of TRS. Specifically, should the Commission amend its TRS rules to authorize or require TRS providers to incorporate RTT capabilities into platforms and terminal equipment used for certain

forms of TRS, in order to enhance its functional equivalence? For example, Omnitor AB asks the Commission to require relay providers to incorporate RTT into their systems, so that callers can use RTT terminals to access TRS with a single step, using ten digit numbers. The Commission notes that at present, some forms of TRS are provided over the PSTN, while others are made available via IP networks. In light of the ongoing migration of communications from the circuit-switched PSTN to IP-based technologies, it appears that ultimately all PSTN-based TRS will be phased out and all TRS will be IP-based. If this occurs, should the Commission authorize or require IP Relay or other TRS providers to support an RTT mode between the user and the CA? If so, what timeline would be appropriate for implementing such capability? The Technology Research Centers suggest this is needed to improve the functional equivalence of the IP Relay interface, as well as to facilitate relay service modes, such as VCO and HCO. Should the Commission also 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? Finally, should the Commission 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? What other requirements are appropriate to assign to RTT or TRS providers to ensure the compatibility of their services as the transition to RTT takes place?

Character and Text Capabilities

61. Commenters in this proceeding point out that one advantage of RTT is that it allows communications using the full Unicode character set, as compared with the more limited character set available on TTY transmissions. They point out that besides facilitating communication in languages other than English, this capability allows users to transmit emoticons, graphic symbols that represent ideas or concepts – independent of any particular language – and specific words or phrases that have become integral to text communications in our society. In addition, commenters report that RTT can be equipped with the ability for users to

control text settings such as font size and color, to adjust text conversation windows, and to set up text presentation.

62. The Commission seeks comment on the technical feasibility, costs, and benefits of requiring that these features of RTT be supported by a covered service provider's implementation of RTT. How can each of these capabilities meet the needs of people with specific disabilities? For example, can the availability of emoji characters help people with cognitive disabilities better communicate with and receive information from others? How well do special characters and emojis translate into voice, and what are the challenges of and best practices for enabling this capability? Is it necessary or desirable to have characters based on Unicode for them to be accessible to screen readers used by people who are blind, visually impaired or deaf-blind? Similarly, to what extent can the ability to set text style and text presentation layout contribute to usability, readability and comprehension of RTT? Should there be an option for the user, depending on preferences and needs, to configure the display of incoming and outgoing text in a certain way? Finally, the Commission seeks comment on the extent to which these capabilities are affected by the properties of network transmissions.

Accessibility, Usability, and Compatibility with Assistive Technologies

63. The Commission believes that RTT is appropriately classified as an "electronic messaging service" and that as such, both RTT services and the equipment used with them are subject to the requirements of section 716 of the Act and part 14 of the Commission's rules. 47 CFR 14.10(i). Therefore, the Commission believes that, independently of any rules specific to RTT that are adopted in this proceeding, RTT services and end user equipment used with them must be accessible, usable, and compatible with assistive technologies, as defined by part 14, to the same extent as is currently required for telecommunications and advanced communications services and equipment under the Commission's accessibility regulations. See 47 U.S.C. 617(a)–(b); 47 CFR 14.21. The Commission seeks comment on this position.

64. The Commission also seeks comment on whether it is possible to identify, more

specifically than is currently identified by its part 14 rules, certain RTT features or functional capabilities that are needed to meet the communication needs of individuals who are deaf-blind, people with cognitive disabilities, or other specific segments of the disability community. For example, should the Commission require compatibility with certain assistive technologies used by people who are deaf-blind, such as refreshable Braille displays or screen enlargers? In addition to providing emoji's, are there other measures that can be taken or required to make RTT effective for people with cognitive disabilities? For example, should there be a mechanism for slowing up the receipt of text, or an option to enable message turn-taking to make it easier for these individuals to receive and read incoming messages? What features should be incorporated on terminal equipment used by these individuals to allow easy activation and operation of RTT functions?

Other Features

65. In addition to the above specific capabilities, the DAC recommends that the Commission consider whether compliant RTT equipment and services should be required to support the following telecommunications functions that are available to voice-based telephone users:

- The ability to "transfer a communication session using the same procedures used in voice telecommunication endpoints on the system";
- The ability to "initiate a multi-party teleconference using the same procedures used in voice telecommunication endpoints on the system";
- The ability to "use messaging, automated attendant, and interactive voice response systems"; and
- The ability to use caller identification and similar telecommunication functions.

The Commission tentatively concludes that such functions should be available to RTT users as necessary for effective communication, and it seeks comment on this tentative conclusion, including the costs, benefits, and technical feasibility of supporting these functions. The Commission also seeks comment on the extent to which the availability of each of these functions

may be affected by how a service provider implements RTT in an IP network.

66. Additionally, the Commission seeks comment on whether to require that compliant RTT provide the ability to participate on multiple calls simultaneously and to leave and access voice and text mail, both of which are also telecommunications functions that must be made accessible to people with disabilities by federal agencies under section 508 of the Rehabilitation Act. See 36 CFR 1194.23, 1194.31(c), (e). Some commenters explain that when retrieving messages from voice mail, text information, including the name of the caller, return number (from caller ID), length of the call, time of the call, and related details could be sent and be viewable on screens. For interactive voice response prompts, they report, instant text of all the choices could be made available to callers.

Support of RTT Functionalities in Wireless Devices

Features and Functionalities

67. The Commission proposes to require that handsets and other end user devices subject to an RTT support requirement be required to support each of the RTT functionalities discussed above for service providers. The Commission seeks comment on this proposal, including its costs, benefits, and technical feasibility. To what extent are these features and functions under the service provider's or manufacturer's control? Are there other features and functionalities that should be required for end user devices to effectively support RTT? Further, to what extent can such features and functionalities and their associated benefits be obtained if RTT is not fully incorporated as a native function of end user devices, but is merely available for users to download or install as an over-the-top application? To what extent would it make a difference if an RTT application is installed as a "default" app prior to sale of a handset or end user device?

Device Portability and Interface with Third-Party Applications

68. In order to ensure that individuals can use a single device on multiple networks, to the same extent as is currently possible with voice communications, there must be a stable interface between user equipment and VoIP networks. For example, if subscribers to one wireless provider

were to lose RTT communication capability when they insert a subscriber identity module (SIM) card for another wireless provider into their smartphones, then the inter-network portability achieved for voice users' smartphones would be unavailable to RTT users, and the Commission's rules may fail to achieve functional equivalence in this critical respect. Therefore, the Commission proposes to require, at a minimum, that covered service providers enable device portability for their RTT services to the same extent as they enable device portability for voice services. The Commission seeks comment on this proposal.

69. The Commission also seeks comment on the extent to which all necessary functionalities for effective use of RTT can be made available through provider-approved devices and applications, or whether third party software applications will be needed for some RTT features and functions. To what extent will consumers need access to third party RTT software applications on user devices to supplement native RTT capabilities that are integrated into such devices, in order to achieve functional equivalence with voice communications? Should the Commission require providers to offer an "app interface" to facilitate access to third party applications?

70. In the event that the Commission adopts requirements for device portability or the enabling of third party applications, or both, it seeks comment on the availability or feasibility of a safe-harbor standard for a user-network interface that could support the RTT capabilities of user devices and applications from multiple manufacturers and providers. Alternatively, are there reasonable performance criteria that could be applied to ensure that a network-user interface can support multiple third party devices and applications?

Minimizing Costs Incurred by Consumers

71. Last, the Commission seeks comment on equipment costs to consumers that may result from the transition from TTY to RTT technology. Specifically, the Commission seeks comment on whether there are measures it could take in the context of this proceeding to ensure the affordability of new terminal equipment or assistive devices that may be needed as a consequence

of the migration to RTT technology, and whether such measures are appropriate. The Commission expects that many off-the-shelf VoIP devices will be usable with RTT – eliminating altogether the need for specialized equipment. In addition, the Commission notes that several states have programs that distribute specialized communications equipment to people, often based on their economic need. Similarly, the Commission administers the National Deaf-Blind Equipment Distribution Program, which provides funding for certified state programs to distribute communications equipment and provide related services to low income individuals who are deaf-blind across the United States. 47 CFR 64.610. AARP recommends that carriers seeking to transition to IP systems be required to work with governmental agencies that distribute such assistive equipment to qualified individuals with disabilities. The Commission seeks comment on the appropriateness of this suggestion, and other ways that the Commission can alleviate any burdens that might be associated with acquiring new equipment or software, particularly for those who do not qualify for existing state and federal equipment distribution programs or for those will need to replace devices not covered by such programs.

Consumer Outreach and Notifications

72. To ensure a seamless TTY-RTT transition, the Commission seeks comment on the best means of informing the public, including businesses, governmental agencies, and individuals with disabilities who will be directly affected by the transition, about the migration from TTY technology to RTT and the mechanics of how this technology will work. To be effective, RTT must be usable by people with and without disabilities. Accordingly, the Commission tentatively concludes that such outreach should not only focus on people with disabilities, but also on the general public that will be communicating with such individuals, and seeks comment on this tentative conclusion. The Commission seeks comment on whether the statutory authority on which it proposes to rely for the purpose of regulating the provision of RTT is sufficient to authorize outreach requirements with respect to RTT. The Commission notes that it has previously used its authority under section 225 of the Act to require service providers to conduct

outreach about TRS, and now asks whether it can rely upon such authority to require outreach on RTT. See 47 CFR 64.604(c)(3). What are the most effective methods to provide such notification, and to what extent should covered entities coordinate with consumer and industry stakeholders to develop effective messaging and outreach initiatives? Further, to what extent should the outreach conducted by manufacturers and service providers include outreach to the operators of public TTYs and Wi-Fi phone installations?

73. Prior to the adoption of document FCC 16-53, the Commission's Consumer and Governmental Affairs Bureau, together with three other bureaus within the Commission, granted various wireless carriers temporary waivers of the Commission's requirements to support TTY technology on IP-based wireless networks subject to certain conditions. The Commission proposes that the conditions imposed in the bureaus' waiver orders remain in effect until the full implementation of rules adopted in this proceeding. 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). The Commission tentatively concludes that the provision of this information is necessary to ensure that, during the transition period, there is no expectation on the part of consumers with disabilities that TTY technology will be supported by IP-based wireless services, and to ensure that these consumers know that alternative accessible telecommunications options exist, and seeks comment on this belief. The Commission further proposes that all information and notifications about the RTT transition be provided in accessible formats, such as large print, Braille, and other appropriate means to make information accessible to people with disabilities,

and seeks comment on this proposal. Are any different or additional notices needed to ensure that consumers are aware of potential issues regarding 911 communications during a TTY-RTT transition?

74. Finally, the Commission tentatively concludes that, consistent with the usability requirements of its rules implementing sections 255 and 716 of the Act (see 47 CFR 6.11(a)(3), 7.11(a)(3)) as well as previous actions by the Commission to educate consumers about TRS (see 47 CFR 64.604(c)(2)), covered entities should be required to implement a mechanism to provide information and assistance during business hours to their consumers regarding the TTY-RTT transition, and seeks comment on this tentative conclusion. The Commission seeks comment on how this can best be achieved. For example, to what extent should covered entities be required to designate staff trained to assist consumers with the complex issues related to the TTY-RTT transition? Are there additional mechanisms for outreach education and assistance that should be adopted?

Other Matters

75. Security Concerns. The Commission seeks comment on security risks that may be associated with the adoption of RTT technology and that require the Commission's attention. The Technology Research Centers point out the availability of technical methods to secure SIP calls, both for call control security and media security. They also caution against "blocking of RTT," which they say could occur where security or IT management personnel are not aware of the need to support real-time text. They explain that this can be remedied by the use of a "SIP-aware firewall," which will allow the proper pass-through of RTT once deployed. The Commission seeks comment on these and other security concerns that should be addressed through this proceeding, including the costs, benefits, and technical feasibility of implementing specific security measures.

RTT Implementation in IP-Based Wireline Networks and Equipment

76. The Commission seeks comment on whether, in addition to requiring the implementation

of RTT by wireless service providers, the Commission should amend its rules to require the implementation of RTT in IP-based wireline networks. As discussed above, problems associated with TTY transmissions are not limited to those that occur over IP wireless networks. Because TTYs were not designed for the IP environment, they have not performed well in any IP-based system; in fact, many of the problems associated with TTY use over IP-enabled wireless networks – e.g., dropped packets and data connection stability issues – also occur in wireline networks. Thus, as an initial matter, the Commission seeks comment on the extent to which wireline IP networks can reliably support TTY communications.

77. Moreover, there is considerable information in the record that in any communications environment, TTYs remain inadequate with respect to their speed, their limited character set, and their failure to allow the simultaneous communication enjoyed by voice communications users. The Commission thus next seeks comment on whether the Commission should amend its rules at parts 6, 7, 14, and 64, to allow or require wireline VoIP service providers to support RTT, as the Commission is proposing to do for wireless services. What would be the costs, benefits, and technical feasibility of such requirements? The Commission believes that for RTT to effectively replace TTYs and allow full integration by people with disabilities into our nation's mainstream communications system, the ability to access our nation's wireline VoIP services using RTT will be just as important as the ability to access wireless services, especially if TTY technology is phased out. Many, if not most businesses, government agencies, and retail establishments continue to rely on wireline services, and having telephone access to such enterprises will be necessary for people with disabilities who rely on text to maintain their independence, privacy, and productivity.

78. If the Commission amends its rules governing wireline services to incorporate RTT support obligations, how can the Commission ensure that end users can readily connect to and use such RTT capabilities in wireline IP networks? For example, given that wireline part 68 customer premise equipment such as wired and cordless phones currently cannot readily support

real-time text, would it be feasible and practical for wireline VoIP service providers to offer over-the-top RTT applications downloadable to text-capable devices such as smartphones, tablets, and computers, that could then be used to connect to the carrier's VoIP service platform? Should wireline VoIP providers be required to ensure the compatibility of their services with third-party RTT applications present in stand-alone devices or downloaded onto text-capable devices such as smartphones, tablets, and computers? To what extent should wireline VoIP manufacturers have RTT support obligations for their equipment that is otherwise capable of sending, receiving, and displaying text? To the extent that IP-based wireline service providers and manufacturers have an obligation under the Commission's rules to support RTT, should they be required to adhere to the same interoperability requirements, minimum functionalities, and outreach obligations that the Commission proposes to require for wireless VoIP services and end user devices? Finally, is RFC 4103 an appropriate standard to reference as the safe harbor for wireline VoIP services and text-capable end user equipment to ensure interoperability and compliance with the rules proposed for wireless services?

79. The Commission also seeks comment on the appropriate timing for incorporation of RTT capabilities into wireline VoIP services and end user devices, in the event that rules requiring such capabilities are adopted, and the extent to which such timing should be determined by the manufacture or sell date of new devices. Similarly, should requirements for RTT support also be triggered at "natural opportunities"? The Commission also seeks comment on whether RTT would be particularly beneficial in the context of Inmate Calling Services (ICS), particularly given the problems ICS users have encountered in trying to use TTYs, and whether there are specific issues the Commission would need to consider in relation to the use of RTT by inmates.

80. Finally, how should TTY support obligations be modified as wireline networks discontinue their circuit-switched services? Should wireline providers that support RTT on their IP networks be permitted to cease supporting TTY technology at all, and if so, on what timetable? In comments filed in response to the Emerging Wireline Order and Further Notice, AARP has

raised concerns about establishing firm dates for the sunset of TTY technology, given that a large number of carriers "serving millions of subscribers, may continue to deliver voice services over legacy facilities for an extended period." AARP claims that "[a]dopting hard and fast sunset dates may lead to customer confusion, and place undue burdens on some service providers and their customers" and urges that, if the Commission establishes a termination date for TTY technology, it do so only for specific carriers that have filed for relief under section 214 of the Act. The Commission seeks comment on these claims and how it should consider the needs of consumers who still use TTYs in framing rules to address a transition to wireline implementation of RTT.

Legal Authority

81. The Commission believes that it has sufficient legal authority to adopt the proposed rules to specify support for RTT communications by wireless IP-based services and equipment. The Commission also believes that it has sufficient legal authority, should it so decide, to amend the Commission's rules to similarly specify support of RTT technology by wireline IP-based services and equipment. Further, the Commission believes that it may rely on the sources of authority identified above, as well as the specific authorities discussed below, to require that RTT provided pursuant to the proposed rule amendments must meet the interoperability, minimum functionality, and outreach requirements proposed above. The Commission seeks comment on these views, as well as whether there are other sources of authority beyond those described herein to support the proposals herein.

Amendment of § 20.18

82. The Commission believes its proposal to amend § 20.18(c) of its rules to require wireless VoIP service providers to ensure that their services, handsets, and other authorized devices are capable of transmitting 911 calls through RTT technology over IP networks, in lieu of transmitting 911 calls from TTYs, is within the Commission's Title III authority to regulate wireless service providers. Title III authorizes the Commission, among other things, to prescribe

the nature of the service to be rendered by licensed service providers and to modify the terms of existing licenses where such action will promote the public interest, convenience, and necessity. 47 U.S.C. 303(b), (g), 316(a)(1). The Commission relied on Title III in regulating the location capabilities of wireless services and handsets and in adopting the rule requiring wireless providers to transmit 911 calls from individuals made on non-handset devices such as TTYs. The Commission further relied on Title III in requiring wireless providers to support text-to-911 service, concluding that Title III confers broad authority to prescribe the nature of the emergency service obligations of wireless providers, including deployment of text-to-911 capabilities.

83. The Commission further believes that its RTT-related proposed amendments to section 20.18 of its rules are within the Commission's direct statutory authority under section 106 of the CVAA to implement recommendations proposed by the EAAC (47 U.S.C. 615c(c)), as well as "to promulgate . . . any other 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." 47 U.S.C. 615c(g). The Commission relied on this authority to impose text-to-911 requirements on wireless providers and interconnected text service providers, as well as to require bounce-back messaging when a PSAP is unable to accept a text calls. The Commission's determination rested on two grounds: (1) that it was a proper exercise of the agency's authority to promulgate EAAC recommendations, and (2) that it was a lawful exercise of the agency's CVAA authority to promulgate certain "other regulations." See 47 U.S.C. 615c(g).

84. The EAAC submitted several recommendations to the Commission that appear to be particularly relevant to this proceeding. For example, the EAAC recommended "that the FCC adopt requirements that ensure that the quality of video, text and voice communications is sufficient to provide usability and accessibility to individuals with disabilities based on industry standards for the environment." The EAAC also recommended "that the FCC remove the

requirement for TTY (analog real-time text) support for new IP-based consumer services that implement IP-based text communications that include at a minimum real time text or, in an LTE environment, IMS Multimedia Telephony that includes real-time text." The Commission seeks comment on whether these or other of the EAAC's recommendations, including those involving the migration to a national IP-enabled network," provide an additional basis for the Commission to rely on its authority under 47 U.S.C. 615c(g) to adopt the amendments proposed here. The Commission also seeks comment generally on the scope of the Commission's authority under section 106 of the CVAA with respect to adoption of rules governing access to emergency services via RTT. 47 U.S.C. 615c.

85. The Commission also has been granted broad authority to ensure effective telephone access to emergency services that may be relevant here, given the suggested importance of RTT as a means of securing emergency assistance. This includes, for example, the specific delegation of responsibility to the Commission under 47 U.S.C. 251(e)(3) to "designate 911 as the universal emergency telephone number for reporting an emergency to appropriate authorities and requesting assistance," the Wireless Communications and Public Safety Act of 1999 (codified at 47 U.S.C. 615 – 615b) and the NET 911 Improvement Act of 2008 (codified at 47 U.S.C. 615a). The Commission seeks comment on the possible relevance of these sources of authority to this proceeding.

86. Generally, the Commission tentatively concludes that the sources of legal authority for the actions taken in connection with the above-described 911 initiatives support the initiative the Commission is launching today, given the similarities – and despite the differences – between them. Major objectives of these 911 initiatives have been to ensure that (1) CMRS and other covered wireless providers provide an interim mobile text solution for this important constituency during the transition to NG911, and (2) the needs of people with disabilities do not get left behind as technology develops. The proceeding here addresses a current gap in the availability of emergency communications services by people with disabilities vis-à-vis those now widely

available to the population at large, namely, the disparity in the opportunity to engage in real-time communications with emergency providers. To rectify this deficiency, RTT offers the opportunity to engage in text communications on a real-time basis, which comes much closer to voice than the currently available text-based communications vehicles. Analogous to the earlier 911 initiatives, the above-cited legal authorities support the Commission's use of the measures proposed here to provide people who are deaf, hard of hearing, deaf-blind, and speech-disabled with the opportunity to access real time communications service in emergency situations when the need for such capabilities is most pressing. The Commission seeks comment on its tentative conclusion and assessment.

Amendment of Parts 6, 7, and 14

87. The Commission believes that it is within its authority under sections 251, 255, and 716 of the Act to amend parts 6 and 7 of the Commission's rules to require providers of interconnected wireless VoIP service (as well as manufacturers of equipment used with such services) to support RTT, if readily achievable (under parts 6 and 7), and to amend part 14 to require wireless providers of VoIP service (as well as manufacturers of equipment used with such services) not subject to parts 6 and 7 to support RTT, unless this requirement is not achievable (under part 14). Likewise, given that the Commission seeks comment above on whether to provide for support of RTT on wireline networks, the Commission notes its belief that the Commission has sufficient authority under these provisions to amend its rules to similarly require providers of wireline VoIP services and manufacturers of equipment used with such services to support RTT, should the Commission so decide. The Commission further believes that these sections provide sufficient authority to impose requirements to ensure that RTT is compatible with assistive technologies used by people with disabilities, such as refreshable Braille displays used by people who are deaf-blind, and seeks comment on this position.

88. Section 255 of the Act requires providers of telecommunications service and manufacturers of telecommunications and customer premises equipment to ensure that their

services and equipment are accessible to and usable by individuals with disabilities, if readily achievable. Section 251(a)(2) of the Act provides that telecommunications carriers may not install network features, functions, or capabilities that do not comply with the guidelines and standards established pursuant to section 255 of the Act. 47 U.S.C. 251(a)(2). Section 716 of the Act requires providers of ACS and manufacturers of equipment used with ACS to ensure that their services and equipment are accessible to and usable by individuals with disabilities, unless such requirements are not achievable, and directs the Commission to promulgate implementing regulations. 47 U.S.C. 617. ACS, in turn, is defined to include interconnected and non-interconnected VoIP service, as well as electronic messaging service and interoperable video conferencing service. 47 U.S.C. 153(1). Both sections 255 and 716 of the Act require that, to the extent that it is not achievable to make a service accessible and usable, service providers "shall ensure that [their] equipment or service is compatible with existing peripheral devices or specialized customer premises equipment [SCPE] commonly used by individuals with disabilities to achieve access," if readily achievable, under section 255 of the Act, or unless not achievable, under section 716 of the Act. 47 U.S.C. 255(d), 617(c). The Commission seeks comment on whether these statutory provisions provide sufficient authority to establish RTT requirements for wireless and wireline services and equipment.

89. Congress intended for these provisions collectively to ensure access by people with disabilities to our nation's telecommunications and advanced communications services, and gave the Commission broad authority to determine how to achieve this objective. 47 U.S.C. 154(i). For example, section 716 of the Act directs the Commission to prescribe regulations that "include performance objectives to ensure the accessibility, usability, and compatibility of advanced communications services and the equipment" and "determine the obligations under this section of manufacturers, service providers, and providers of applications or services accessed over service provider networks." 47 U.S.C. 617(e)(1)(A), (C). Given the limitations of TTY technology, the Commission believes that RTT is best suited to replace TTY technology for rendering voice IP

services accessible to people who are deaf, hard of hearing, deaf-blind, or speech-disabled. The Commission seeks comment on this analysis.

Amendment of Part 64

90. The Commission believes that it has sufficient authority under the Act to adopt the proposed amendments to part 64 of its rules to require wireless VoIP service providers to support the provision of and access to TRS via RTT. The Commission also believes that the Commission has sufficient authority under these provisions to adopt similar amendments to require wireline VoIP service providers to support RTT for the provision of and access to TRS.

91. Section 225 of the Act directs the Commission to "ensure that interstate and intrastate telecommunications relay services are available, to the extent possible and in the most efficient manner, to hearing-impaired and speech-impaired individuals in the United States," and further to prescribe implementing regulations, including functional requirements and minimum standards. 47 U.S.C. 225(b)(1), (d)(1). Congress initially placed the obligation to provide TRS on common carriers "providing telephone voice transmission services," either on their own or through a state-supported TRS program, in compliance with the implementing regulations prescribed by the Commission. 47 U.S.C. 225(c). Pursuant to the Commission's ancillary jurisdiction, the Commission extended the TRS obligations to interconnected VoIP providers. Included in the TRS obligations of carriers and interconnected VoIP service providers is the obligation to support access to TRS call centers, including through abbreviated 711 dialing access for TRS calls initiated by TTYs. The Commission believes that it has sufficient authority under these provisions to require VoIP service providers to support TRS access via RTT in lieu of requiring support for TTY technology. Section 225 of the Act does not require that TRS be provided or accessed with TTYs. See 47 U.S.C. 225(a)(3). Further, section 225 of the Act expressly directs the Commission to "ensure that regulations prescribed to implement this section encourage . . . the use of existing technology and do not discourage or impair the development of improved technology." 47 U.S.C. 225(d)(2). The Commission seeks comment on this analysis.

INITIAL REGULATORY FLEXIBILITY ACT ANALYSIS

92. As required by the Regulatory Flexibility Act, the Commission has prepared this present 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 document FCC 16-53. 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 DATES section. The Commission will send a copy of document FCC 16-53, including the IRFA, to the Chief Counsel for Advocacy of the Small Business Administration (SBA). See 5 U.S.C. 603(a).

Need For, and Objectives of, the Proposed Rules

93. In document FCC 16-53, the Commission proposes amendments to 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. The Commission's proposals would replace existing requirements mandating support for TTY technology with rules for wireless IP-based voice services to support RTT technology instead. 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.

94. The Commission seeks comment on the following:

- Its proposal to replace the Commission's rules that require wireless service providers and equipment manufacturers to support TTY technology with rules defining the obligations of these entities to support RTT technology over IP-based voice services.
- Its tentative conclusions that the technical and functional limitations of TTYs make this technology unsuitable as a long-term means to provide full and effective access to IP-based

wireless telephone networks, that there is a need to provide individuals who rely on text communication with a superior accessibility solution for the IP environment, and that RTT can best achieve this goal because it can be well supported in the wireless IP environment, will facilitate emergency communications to 911 services, allows for more natural and simultaneous interactions on telephone calls, will largely eliminate the need to purchase specialized or assistive devices that connect to mainstream technology, and may reduce reliance on telecommunications relay services.

- Its proposal to make the above amendments effective by December 31, 2017, for large wireless service providers and manufacturers of user devices authorized for their services, its proposal to give additional time for compliance by smaller service providers and manufacturers of user devices authorized for their services, and the amount of additional time that would be appropriate.
- Its tentative conclusions that deployment of RTT on IP networks will offer functionality greatly superior to that of TTY technology; that the ability to acquire off-the-shelf RTT-capable devices will be beneficial for text communication users; and that RTT will be more effective than messaging-type services such as short messaging services (SMS) in meeting the communication needs of consumers with disabilities, including their emergency communication needs.
- Its tentative conclusion that for effective RTT communications across multiple platforms and networks, such communications and the associated terminal equipment must be interoperable with one another.
- Its proposal to adopt a standard developed by the Internet Engineering Task Force (IETF), RFC 4103, as a safe harbor technical standard, adherence to which will be deemed to satisfy the interoperability requirement for RTT communications.

- Its proposal that service providers should be required to make their RTT services interoperable with TTY technology supported by circuit-switched networks, and when that requirement should sunset.
- Its proposal to require that wireless providers and equipment manufacturers implementing RTT support the following telecommunications functions:
    - use of the same North American Numbering Plan numbers used for voice, to initiate and receive calls;
    - 911 emergency communications in full compliance with all applicable 911 rules;
    - transmission of characters within one second of when they are generated, with no more than a 0.2 percent character error rate, which equates to approximately a one percent word error rate;
    - simultaneous voice and text transmission;
    - TRS access;
    - a comprehensive character set and the ability to control text settings such as font size and color, to adjust text conversation windows, and to set up text presentation;
    - compliance with the Commission's existing accessibility regulations for "electronic messaging services"; and
    - other calling features such as call transfer, teleconferencing, caller identification, voice and text mail, and interactive voice response systems.
- Its proposal to require wireless service providers implementing RTT to enable device portability for their RTT services to the same extent as for voice services and whether to require such providers to enable the use of third party RTT software applications on user devices to supplement the native RTT capabilities.
- Measures that may be needed to ensure the affordability of new terminal equipment or assistive devices that may be needed as a consequence of the migration to RTT technology.

- Its proposal to require wireless service providers to notify their customers about the inability to use TTYs with IP-based services and about alternative means of reaching 911 services.
- The best means of informing the public, including businesses, governmental agencies, and individuals with disabilities who will be directly affected by the transition, about the migration from TTY technology to RTT and the mechanics of how this technology will work.
- Security risks that may be associated with the adoption of RTT technology and that require the Commission's attention.
- Whether to require the implementation of RTT in IP-based wireline networks, including:
    - Whether to require wireline voice-over-IP (VoIP) service providers to support RTT, as the Commission is proposing to do for wireless services;
    - How to ensure that end users can readily connect to and use RTT capabilities in wireline networks, and whether it would be feasible and practical for wireline VoIP service providers to offer downloadable over-the-top RTT software applications;
    - Whether to require VoIP providers to ensure the compatibility of their services with third-party RTT software applications downloaded onto text-capable devices such as smartphones, tablets, and computers;
    - The extent to which wireline VoIP manufacturers should have RTT support obligations for their equipment that is otherwise capable of sending, receiving, and displaying text;
    - Whether IP-based wireline service providers and manufacturers should be required to adhere to the same interoperability requirements, minimum functionalities, and outreach obligations as those proposed for wireless VoIP services and end user devices;
    - Whether RFC 4103 is an appropriate standard to reference as the safe harbor for wireline VoIP services and end user equipment to ensure interoperability and compliance with the rules proposed for wireless services; and

- The appropriate timing for incorporation of RTT capabilities into wireline VoIP services and end user devices.

Legal Basis

95. The proposed action is authorized under sections 1, 2, 4(i), 225, 255, 303, 316, and 716 of the Act, 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.

Description and Estimate of the Number of Small Entities Impacted

96. 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. The RFA generally defines the term "small entity" as having the same meaning as the terms "small business," "small organization," and "small governmental jurisdiction." In addition, the term "small business" has the same meaning as the term "small-business concern" under the Small Business Act. 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.

97. The majority of the Commission's proposals in document FCC 16-53 will affect obligations on telecommunications carriers and providers, VoIP service providers, wireline and wireless service providers, 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 document FCC 16-53.

98. A small business is an independent business having less than 500 employees. Nationwide, there are a total of approximately 28.2 million small businesses, according to the SBA. Affected small entities as defined by industry are as follows.

Wireline Providers

99. Wired Telecommunications Carriers. The Census Bureau defines this industry as

comprising "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 telecommunications 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." 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. According to Census Bureau data for 2007, there were 3,188 firms in this category, total, that operated for the entire year. Of this total, 3,144 firms had employment of 999 or fewer employees, and 44 firms had employment of 1000 employees or more. Thus, under this size standard, the majority of firms can be considered small.

100. 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. According to Commission data, 1,307 carriers reported that they were incumbent local exchange service providers. Of these 1,307 carriers, an estimated 1,006 have 1,500 or fewer employees and 301 have more than 1,500 employees. Consequently, the Commission estimates that most providers of local exchange service are small entities.

101. 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. According to Commission data, 1,307 carriers reported that they were incumbent local exchange service providers. Of these 1,307 carriers, an estimated 1,006 have 1,500 or fewer employees and 301 have more than 1,500 employees. Consequently, the Commission estimates that most providers of incumbent local exchange service are small entities.

102. The Commission has 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." 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. The Commission has therefore included small incumbent LECs in this RFA analysis, although the Commission emphasizes that this RFA action has no effect on Commission analyses and determinations in other, non-RFA contexts.

103. 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. 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. Of these 1,442 carriers, an estimated 1,256 have 1,500 or fewer employees and 186 have more than 1,500 employees. 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. In addition, 72 carriers have reported that they are Other Local Service Providers. Of the 72, seventy have 1,500 or fewer employees and two have more than 1,500 employees. 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.

104. 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. According to Commission data, 359 carriers have reported that they are engaged in the provision of interexchange service. Of these, an estimated 317 have 1,500 or fewer employees and 42 have more than 1,500 employees. Consequently, the Commission estimates that the majority of IXCs are small entities.

105. 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. According to Commission data, 284 companies reported that their primary telecommunications service activity was the provision of other toll carriage. Of these, an estimated 279 have 1,500 or fewer employees and five have more than 1,500 employees. Consequently, the Commission estimates that most Other Toll Carriers are small entities.

Wireless Providers

106. Wireless Telecommunications Carriers (except Satellite). Since 2007, the Census Bureau has placed wireless firms within this new, broad, economic census category. 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." Under the present and prior categories, the SBA has deemed a wireless business to be small if it has 1,500 or fewer employees. For the category of Wireless Telecommunications Carriers (except Satellite), census data for 2007 show that there were 1,383 firms that operated for the entire year. Of this total, 1,368 firms had employment of 999 or fewer employees. Since all firms with fewer than 1,500 employees are considered small, given the total employment in the sector, the Commission estimates that the vast majority of wireless firms are small entities.

Cable Service Providers

107. 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. Industry data indicate that there are currently 4,600 active cable systems in the United States. Of this total, all but nine cable operators nationwide are small under the 400,000-subscriber size standard. In addition, under the Commission's rate regulation rules, a "small system" is a cable system serving 15,000 or fewer subscribers. Current Commission records show 4,600 cable systems nationwide. Of this total, 3,900 cable systems have fewer than 15,000 subscribers, and 700 systems have 15,000 or more subscribers. Thus, under this standard, the Commission estimates that most cable systems are small entities.

All Other Telecommunications

108. 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." 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. According to Census Bureau data for 2007, there were 2,383 firms in this category that operated for the entire year. Of these, 2,346 firms had annual receipts of under $25 million. Consequently, the Commission estimates that the majority of these firms are small entities.

109. TRS Providers. These services can be included within the broad economic 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. However, because Sprint's primary business fits within the definition of Wireless Telecommunications Carriers (except Satellite), Sprint is not considered to be within the category of All Other Telecommunications. As a result, six of the authorized TRS providers can be included within the broad economic census category of All Other Telecommunications. 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. Under this category and the associated small business size standard, approximately half of the TRS providers can be considered small.

Manufacturers of Equipment to Provide VoIP

110. Entities manufacturing equipment used to provide interconnected VoIP, non-interconnected VoIP, or both are generally found in one of two Census Bureau categories, "Electronic Computer Manufacturing" or "Telephone Apparatus Manufacturing." While the Commission recognizes that the manufacturers of equipment used to provide interconnected VoIP will continue to be regulated under section 255 of the Act rather than under section 716 of the Act, the Commission includes here an analysis of the possible significant economic impact of the

Commission's proposed rules on manufacturers of equipment used to provide both interconnected and non-interconnected VoIP because it was not possible to separate available data on these two manufacturing categories for VoIP equipment. In light of this situation, the estimates below are in all likelihood overstating the number of small entities that manufacture equipment used to provide interconnected VoIP and which are subject to the proposed section 716 rules. However, in the absence of more accurate data, the Commission presents these figures to provide as thorough an analysis of the impact on small entities as it can at this time, with the understanding that it will modify its analysis as more accurate data becomes available in this proceeding.

111. 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) 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." In this category, the SBA has deemed an electronic computer manufacturing business to be small if it has fewer than 1,000 employees. According to Census Bureau data for 2007, there were 425 establishments in this category that operated that year. Of these, 419 had less 1,000 employees. Consequently, the Commission estimates that the majority of these

establishments are small entities.

112. Telephone Apparatus Manufacturing. The Census Bureau defines this category to comprise "establishments primarily engaged in manufacturing wire telephone and data communications equipment." The Census Bureau further states: "These products may be stand alone 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."

113. In this category, the SBA has deemed a telephone apparatus manufacturing business to be small if it has fewer than 1,000 employees. For this category of manufacturers, Census data for 2007 show that there were 398 such establishments that operated that year. Of those 398 establishments, 393 (approximately 99%) had fewer than 1,000 employees and, thus, would be deemed small under the applicable SBA size standard. Accordingly, the majority of establishments in this category can be considered small under that standard. 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.

114. Computer Terminal Manufacturing. This category "comprises establishments primarily engaged in manufacturing computer terminals. Computer terminals are input/output devices that connect with a central computer for processing." The SBA has developed a small business size standard for this category of manufacturing; that size standard is 1,000 or fewer employees. According to Census Bureau data for 2007, there were 43 establishments in this category that operated that year. Of this total, all 43 had less than 500 employees. Consequently, the Commission estimates that the majority of these establishments are small entities.

Manufacturers of Equipment to Provide Electronic Messaging

115. 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."

116. 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." 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. Census Bureau data for 2007 indicate that in that year 939 such businesses operated. Of that number, 912 businesses operated with less than 500 employees. Based on this data, the Commission concludes that a majority of businesses in this industry are small by the SBA standard.

117. Electronic Computer Manufacturing. This category "comprises 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) 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 programming elements. The manufacture of computers includes the assembly or integration of processors, coprocessors, memory, storage, and input/output devices into a user-programmable final product." The SBA has developed a small business size standard for this category of manufacturing; that size standard is 1,000 or fewer

employees. According to Census Bureau data for 2007, there were 425 establishments in this category that operated that year. Of these, 419 had less 1,000 employees. Consequently, the Commission estimates that the majority of these establishments are small entities.

Manufacturers of Equipment to Provide Interoperable Video Conferencing Services

118. Other Communications Equipment Manufacturing. Entities that manufacture equipment used to provide interoperable and other video conferencing services are generally found in the Census Bureau category: "Other Communications Equipment Manufacturing." The Census Bureau defines this category to include: "…establishments primarily engaged in manufacturing communications equipment (except telephone apparatus, and radio and television broadcast, and wireless communications equipment)." In this category, the SBA has deemed a business manufacturing other communications equipment to be small if it has fewer than 750 employees. For this category of manufacturers, Census data for 2007 show that there were 452 such establishments that operated that year. Of those 452 establishments, all 452 (100 %) had fewer than 1,000 employees and 448 of those 452 (approximately 99%) had fewer than 500 employees. Between these two figures, the Commission estimates that about 450 establishments (approximately 99.6%) had fewer than 750 employees and, thus, would be considered small under the applicable SBA size standard. Accordingly, the majority of establishments in this category can be considered small under that standard. On this basis, Commission estimates that approximately 99.6% or more of the manufacturers of equipment used to provide interoperable and other video conferencing services are small entities.

Manufacturers of Software

119. 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."

120. Software Publishers. This category "comprises establishments primarily engaged in computer software publishing or publishing and reproduction. 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." The SBA has developed a small business size standard for software publishers, which consists of all such firms with gross annual receipts of $38.5 million or less. For this category, census data for 2007 show that there were 5,313 firms that operated for the entire year. Of those firms, a total of 4,956 had gross annual receipts less than $25 million. Thus, a majority of software publishers potentially affected by the proposals in document FCC 16-53 can be considered small.

Description of Projected Reporting, Recordkeeping, and Other Compliance Requirements

121. Although document FCC 16-53 proposes to require support for RTT in lieu of TTY technologies in all IP-based wireless services, and seeks comment on whether to require the implementation of RTT in IP-based wireline networks, document FCC 16-53, for the most part, does not propose or seek comment on new or modified reporting, recordkeeping, and other compliance requirements. However, document FCC 16-53 seeks comment on the best means of informing the public, including businesses, governmental agencies, and individuals with disabilities who will be directly affected by the transition, about the migration from TTY technology to RTT and the mechanics of how this technology will work.

Steps Taken to Minimize Significant Economic Impact on Small Entities, and Significant Alternatives Considered

122. 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."

123. Document FCC 16-53 proposes rules intended to replace obsolete TTY technology with RTT to ensure consumer access to IP services via wireless text-based communications and seeks comment on whether to do the same for wireline text-based communications. 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, 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, with the proposal to phase out TTY technology, the burden is reduced for small entities and emergency call centers to maintain such technology in the long term.

124. The Commission proposes an implementation deadline for RTT technology of December 31, 2017, for the wireless providers that offer nationwide service, and manufacturers of end user devices authorized for their services, and to reduce the burden and relieve possible adverse economic impact on small entities, seeks comment on an appropriate deadline for all other wireless providers and equipment manufacturers. In addition, the Commission seeks comment from providers of wireline VoIP services, including small entities, on the appropriate timing for incorporation of RTT capabilities into wireline VoIP services and end user devices.

125. In document FCC 16-53, while the Commission proposes a "safe harbor" technical standard to ensure RTT interoperability, it proposes to allow service providers and carriers to use alternative protocols for RTT, provided that they are interoperable. Further, throughout the item, flexibility is integrated in the proposed requirements in order to take into consideration the limitations of small businesses. For instance, the proposed requirement that equipment manufacturers supporting RTT offer certain functions as native features on VoIP-enabled terminal devices that can send, receive, and display text is subject to the condition that such features be achievable. As such, the Commission anticipates that these proposals will have little

to no impact on small entities that are eligible to claim that the requirement is not achievable.

126. The Commission believes that any requirement for service providers and manufacturers to implement outreach and notification to consumers about the transition from TTY to RTT will not require significant additional resources for small entities, and in any event would be outweighed by the need for consumers to understand the changes in the services and associated equipment that they will be receiving.

Federal Rules Which Duplicate, Overlap, or Conflict With, the Commission's Proposals

127. None.

ORDERING CLAUSES

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, document FCC 16-53 IS ADOPTED.

The Commission's Consumer Information Bureau, Reference Information Center, SHALL SEND a copy of document FCC 16-53, including the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

List of subjects in 47 CFR part 6

Individuals with disabilities, access to telecommunication service and equipment, and customer premise equipment.

List of subjects in 47 CFR part 7

Individuals with disabilities, access to voice mail and interactive menu services and equipment.

List of subjects in 47 CFR part 14

Individuals with disabilities, access to advanced communication services and equipment.

List of subjects in 47 CFR part 20

Commercial mobile services, individuals with disabilities, access to 911 services.

List of subjects in 47 CFR part 64

Telecommunications relay services, individuals with disabilities.

List of subjects in 47 CFR Part 67

Real-time text, individuals with disabilities.

FEDERAL COMMUNICATIONS COMMISSION.

Marlene H. Dortch,
Secretary.

For the reasons discussed in the preamble, the Federal Communications Commission proposes to amend 47 CFR parts 6, 7, 14, 20, 64, and 67 as follows:

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

1. The authority citation for part 6 continues to read as follows:

Authority: 47 U.S.C. 151–154, 251, 255, and 303(r).

2. Amend § 6.3 by adding paragraphs (a)(3), (b)(5), (m), and (n) to read as follows:

§ 6.3 Definitions.

(a) * * *

(3) Real-Time Text. Effective December 31, 2017, for wireless VoIP services and text-capable user devices used with such services, the service or device supports real-time text communications, in accordance with 47 CFR part 67.

(b) * * *

(5) Wireless VoIP Exemption. Wireless VoIP services 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 § 67.1 of this chapter.

(n) The term text-capable 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

3. The authority citation for part 7 continues to read as follows:

Authority: 47 U.S.C. 1, 154(i), 154(j), 208, and 255.

4. Amend § 7.3 by adding paragraphs (a)(3), (b)(5), (n), and (o) to read as follows:

§ 7.3 Definitions.

(a) * * *

(3) Real-Time Text. Effective December 31, 2017, for wireless VoIP services and text-capable user devices used with such services, the service or equipment supports real-time text communications, in accordance with 47 CFR part 67.

(b) * * *

(5) Wireless VoIP Exemption. Wireless VoIP services 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.

* * * * *

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

(o) The term text-capable 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

5. 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.

6. Amend § 14.10 by adding 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 user device means end user equipment that is able to send, receive, and display text.

7. Amend § 14.21 by adding paragraphs (b)(3) and (d)(5) to read as follows:

§ 14.21 Performance Objectives.

* * * * *

(b) * * *

(3) Real-Time Text. Effective July 31, 2017, for wireless VoIP services and text-capable user devices used with such services, the service or device supports real-time text communications, in accordance with 47 CFR part 67.

* * * * *

(d) * * *

(5) Wireless VoIP Exemption. Wireless VoIP services 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

8. 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, 610, 615, 615a, 615b, 615c.

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

§ 20.18 911 Service.

* * * * *

(c) Access to 911 services. (1) Except as provided in paragraph (c)(2) of this section, CMRS providers subject to this section must be capable of transmitting 911 calls from individuals who are deaf, hard of hearing, speech-disabled, and deaf-blind through the use of Text Telephone Devices (TTY), except that CMRS providers transmitting over IP facilities are not subject to this requirement if the CMRS provider supports real-time text communications, in accordance with 47 CFR part 67.

(2) Notwithstanding any other limitation of coverage in this section, the requirements of this paragraph (c)(2) apply to providers of digital mobile service in the United States to the extent that they offer terrestrial mobile service that enables two-way real-time voice communications among

members of the public or a substantial portion of the public. Effective December 31, 2017, such service providers transmitting over IP facilities shall support 911 access via real-time text communications for individuals who are deaf, hard of hearing, speech-disabled, and deaf-blind, in accordance with 47 CFR part 67.

* * * * *

PART 64—MISCELLANEOUS RULES RELATING TO COMMON CARRIERS

10. The authority citation for part 64 continues to read as follows:

Authority: 47 U.S.C. 154, 254(k), 403(b)(2)(B), (c), 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.

11. Amend § 64.601 by revising paragraphs (a)(13), (a)(15), and (a)(42), and adding paragraph (a)(46), to read as follows:

§ 64.601 Definitions and provisions of general applicability.

* * * * *

(a)(13) Hearing carry over (HCO). A form of TRS where the person with the speech disability is able to listen to the other end user and, in reply, the CA speaks the text as typed by the person with the speech disability. The CA does not type any conversation. Two-line HCO is an HCO service that allows TRS users to use one telephone line for hearing and the other for sending TTY messages. HCO-to-TTY allows a relay conversation to take place between an HCO user and a TTY user. HCO-to-RTT is an HCO service that allows a relay conversation to take place between an HCO user and an RTT user. HCO-to-HCO allows a relay conversation to take place between two HCO users.

* * * * *

(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 real-time text (RTT) over an interconnected voice over Internet Protocol service.

* * * * *

(42) Voice carry over (VCO). A form of TRS where the person with the hearing disability is able to speak directly to the other end user. The CA types the response back to the person with the hearing disability. The CA does not voice the conversation. Two-line VCO is a VCO service that allows TRS users to use one telephone line for voicing and the other for receiving TTY messages. A VCO-to-TTY TRS call allows a relay conversation to take place between a VCO user and a TTY user. VCO-to-RTT is a VCO service that allows a relay conversation to take place between a VCO user and an RTT user. VCO-to-VCO allows a relay conversation to take place between two VCO users.

* * * * *

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

* * * * *

12. Amend § 64.603 by revising the introductory text 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, including relay services accessed via RTT communications. 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. Wireless VoIP service providers are not required to provide such access to TTY users if they

provide 711 dialing code access by supporting real-time text communications, in accordance with 47 CFR part 67. Effective [insert date], wireless VoIP service providers shall provide 711 dialing code access by supporting real-time text communications, in accordance with 47 CFR part 67.

* * * * *

13. Amend § 64.604 by revising paragraphs (a)(1)(v) and (vii) to read as follows:

§ 64.604 Mandatory Minimum Standards.

(a) * * *

(1) * * *

(v) CAs answering and placing a TTY- or RTT-based TRS call or VRS call shall stay with the call for a minimum of ten minutes.

* * * * *

(vii) TRS shall transmit conversations between TTY or RTT callers and voice callers in real time.

* * * * *

14. Add part 67 to read as follows:

PART 67 – REAL-TIME TEXT

Sec.

67.1 Definitions.

67.2 Service Provider and Manufacturer Obligations; Minimum Functionalities.

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

§ 67.1 Definitions.

(a) "Authorized 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) "Covered service" means a VoIP or other service that is permitted or required to support RTT pursuant to parts 6, 7, 14, 20, or 64 of this chapter.

(c) “RFC 4103” means standard Internet Engineering Task Force (IETF) Request for Comments (RFC) 4103, Real-time Transport Protocol Payload for Text Conversation (2005) and any successor protocol published by the IETF. RFC 4103 is available at: http://www.ietf.org/rfc/rfc4103.txt.

(d) “RFC 4103-conforming” service or user device means a covered service or authorized user device that enables initiation, sending, transmission, reception, and display of RTT communications in conformity with RFC 4103.

(e) “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.

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

(g) “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 Service Provider and Manufacturer Obligations; Minimum Functionalities.

(a) Service Provider Obligations. A provider of a covered service shall ensure that its service and all authorized user devices using its service support RTT in compliance with this section.

(b) Manufacturer Obligations. A manufacturer shall ensure that its authorized user devices support RTT in compliance with this section.

(c) RTT-RTT Interoperability. Covered services and authorized user devices shall be interoperable with other services and devices that support RTT in accordance with this part. RFC 4103-conforming services and user devices shall be deemed to comply with this paragraph (c). Other covered services or authorized user devices shall be deemed to comply if RTT

communications between such service or user device and an RFC 4103-conforming service or user device are reliably and accurately transcoded

(1) To and from RFC 4103, or

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

(d) RTT-TTY Interoperability. Covered services and authorized user devices shall be interoperable with TTYs connected to other networks. Covered services and authorized user devices shall be deemed to comply with this paragraph (d) 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.

(e) Device Portability. Authorized user devices shall be portable among service providers for RTT communications to the same extent as for voice communications.

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

(1) Initiate and receive RTT calls to and from the same telephone numbers for which they initiate and receive voice calls;

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

(3) Transmit text instantly, so that each text character appears on the receiving device within one second of when it is generated on the sending device, with no more than 0.2 percent character error rate;

(4) Send and receive text and voice simultaneously in both directions on the same call using a single device;

(5) Transfer RTT calls and initiate conference calls using the same procedures used for voice communication;

(6) Use RTT to communicate with and retrieve messages from messaging, automated attendant, and interactive voice response systems; and

(7) Transmit caller identification and conduct similar telecommunication functions with RTT communications.

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