Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Implementation of Sections 716 and 717 of	)	CG Docket No. 10-213
the Communications Act of 1934, as Enacted	)	
by the Twenty-First Century Communications	)	
and Video Accessibility Act of 2010	)	

CTIA PUBLIC NOTICE COMMENTS – ACCESSIBILITY OF COMMUNICATIONS TECHNOLOGIES

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CTIA PUBLIC NOTICE COMMENTS – ACCESSIBILITY OF COMMUNICATIONS TECHNOLOGIES

CTIA[1] is pleased to submit these comments in response to the Public Notice issued by the Consumer and Governmental Affairs Bureau of the Federal Communications Commission (Commission) seeking information to inform the Commission's preparation of its Biennial Report[2] required by the Twenty-First Century Communications and Video Accessibility Act of 2010 (CVAA).[3] As demonstrated herein, wireless industry innovation has resulted in consumers of varying abilities having access to a wide array of service and product options, and with 5G networks and technologies, these options will multiply. The Commission should report to Congress that the CVAA is succeeding in its goal of ensuring that all consumers, including those with disabilities, share in the benefits of advanced communications capabilities.

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1 CTIA® (www.ctia.org) represents the U.S. wireless communications industry and the companies throughout the mobile ecosystem that enable Americans to lead a 21st-century connected life. The association's members include wireless carriers, device manufacturers, and suppliers, as well as apps and content companies. CTIA vigorously advocates at all levels of government for policies that foster continued wireless innovation and investment. The association also coordinates the industry's voluntary best practices, hosts educational events that promote the wireless industry, and co-produces the industry's leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, D.C.

2 *See Consumer and Governmental Affairs Bureau Seeks Comment on the Accessibility of Communications Technologies for the 2018 Biennial Report Required By the Twenty-First Century Communications and Video Accessibility Act*, Public Notice, CG Docket No. 10-213, DA 18-340 (rel. Apr. 5, 2018) ("Public Notice").

3 Twenty-First Century Communications and Video Accessibility Act, Pub. L. No. 111-260 (2010) (codified in various section of 47 U.S.C.).

INTRODUCTION AND SUMMARY

Since the 2016 Biennial Report to Congress,[4] the wireless industry has continued its commitment to the letter and spirit of the CVAA by offering accessible services and equipment and continuing to collaborate with and educate the accessibility community about wireless products and services. Wireless service providers remain committed to providing service plans useful to consumers generally and the accessibility community in particular, such as unlimited data, text, and messaging plans offered at a variety of price points. Moreover, the wireless industry continues to develop innovative equipment with accessible features useable by consumers with vision, hearing, physical, cognitive, and speech limitations.

Importantly, the wireless industry is leading the rapid deployment of Real-Time Text (RTT) to replace 20th century teletypewriters (TTY) with the benefits and flexibility of 21st century communications capabilities for people who are deaf, hard of hearing, or speech impaired. For people who are blind or low vision, the impact of near ubiquitous personal assistant services on wireless handsets and smartphones, such as Apple's Siri, Google's Assistant, Microsoft's Cortana, and Samsung's Bixby, has extended far outside the phone screen, enabling people with disabilities to more easily navigate their world, purchase items, control connected home appliances, and perform a variety of previously inaccessible tasks. And, for people with cognitive disabilities, the wireless industry offers a range of devices with different form factors, features to customize the appearance and timing of tasks, and applications and services to facilitate communication and educational and occupational opportunities. In its

[4] *Implementation of Section 716 and 717 of the Communications Act of 1934, as Enacted by the Twenty-First Century Communications and Video Accessibility Act of 2010*, Biennial Report to Congress as Required by the Twenty-First Century Communications and Video Accessibility Act of 2010, 31 FCC Rcd. 11065 (2016) ("2016 Biennial Report").

report to Congress, the Commission should highlight these and other examples described in CTIA's comments to demonstrate that the CVAA has succeeded in making advanced communications services, as well as a variety of other services and products, accessible to and usable by people with disabilities.

On the cusp of the 5G era, the wireless industry is also poised to deliver greater technological advances that will improve the lives of all Americans, including people with disabilities. The U.S. wireless industry envisions that 5G capabilities will significantly enhance the benefits, services, and capabilities of wireless networks and services, especially as 5G networks are expected to provide up to 100 times faster speeds and support up to 100 times more devices than 4G networks. 5G technology will enable wireless networks to connect billions of devices and sensors, triggering technological advances in health care, education, transportation, and public safety for all consumers, including people with disabilities.

Specifically, in its report to Congress, the Commission should highlight the anticipated benefits of 5G to people with disabilities. The high speeds of 5G services will enhance telehealth and remote medical services by connecting patients to health care professionals wherever and whenever the patient needs support, improving patient outcomes and saving billions of dollars in health care costs. 5G's characteristic low latency will enable virtual and augmented reality programs to support educational and skills training opportunities for both children and adults with cognitive and learning disabilities, along with self-driving vehicles that can increase independence and create economic and job opportunities for users. Indeed, a recent study by the Ruderman Family Foundation estimates self-driving cars could open two million employment opportunities for people with disabilities. Cell-site densification and additional wireless infrastructure needed for 5G will also enhance geo-location capabilities to improve

transportation opportunities and independent living for older adults, people with mobility limitations, and people who are blind or low vision. And 5G will continue to advance home automation that will enhance independent living opportunities for people of diverse abilities.

To realize these benefits and ensure the wireless industry can continue to offer innovative products and services to the benefit of all consumers, the Commission should continue to implement regulatory policies that facilitate and encourage wireless innovation, competition, and investment. Specifically, allocating more spectrum for wireless use and modernizing the Commission's infrastructure siting policies will greatly advance the ability of the wireless industry to rapidly bring the benefits of 5G to consumers. Finally, the Commission should continue to enhance the Request for Dispute Assistance (RDA) process to provide more consistent outcomes for industry and consumers and facilitate the ability of the wireless industry to develop and deploy more accessible products and services.

I. THE U.S. WIRELESS INDUSTRY CONTINUES TO LEAD THE ADVANCEMENT OF ACCESSIBLE SERVICES AND EQUIPMENT TO MEET CONSUMERS' DIVERSE NEEDS.

Accessible wireless services and equipment have become increasingly available since the CVAA became law nearly a decade ago, and especially since the Commission's last report to Congress nearly two years ago. CTIA and its member companies are committed to providing and promoting wireless products and services that enable people with disabilities and the older adult community to access 21st century communications services and technologies, and the undeniable benefits and opportunities that attach.

A. Wireless Service Providers Continue To Offer Accessible Service Plans At Various Price Points That Benefit Consumers With A Variety Of Needs.

Wireless service providers offer an array of competitive service plans at varying price points that meet the needs of a variety of consumers, including those with disabilities.

Unlimited Options. Since the Commission's last report, unlimited mobile wireless data and messaging plans have made a significant return to the U.S. wireless market in response to nearly insatiable consumer demand.[5] Unlimited data and messaging plans can benefit consumers who use messaging or data-intensive applications like video conferencing as a primary way to communicate, including consumers who are deaf or hard of hearing or who are speech impaired. For example, Verizon's Nationwide Messaging Plans include plans at a range of price points with unlimited text, picture, and video messaging, designed specifically for individuals who do not use voice minutes to communicate.[6] AT&T offers specialized Accessibility Plans at varying rates developed for customers who are unable to effectively communicate over voice networks. These plans provide data-only network access and typically include text messaging, e-mail, Internet access, and video calling or multimedia messaging.[7] Similarly, Sprint offers a suite of messaging services that are particularly useful for consumers who are deaf, hard of hearing, or have a speech disability.[8] Notably, Sprint customers have access to the Sprint Relay Store, a specialized store for the deaf and hard-of-hearing community, which offers Data-Only plans as well as video customer service in sign language.[9] T-Mobile's ONE Military gives service

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[5] *See* Peter Cunningham, *Industry Voices—Cunningham: Unlimited plans reign supreme*, FIERCE WIRELESS (Apr. 5, 2018, 9:10 AM), https://www.fiercewireless.com/wireless/industry-voices-cunningham-unlimited-plans-reign-supreme.

[6] Nationwide Messaging Plans, Verizon, http://www.verizon.com/about/accessibility/nationwide-messaging-plans (last visited Apr. 30, 2018).

[7] Basic and Feature Phone Accessibility Plans, AT&T, https://www.att.com/shopcms/media/att/2016/shop/wireless/landing/disability-aging/pdf/PDF-Basic-and-feature-phone-accessibility-plans.pdf (last visited Apr. 30, 2018).

[8] Sprint Accessibility – Wireless, Sprint, https://www.sprint.com/en/shop/services/accessibility/wireless.html#sprint-relay-store (last visited Apr. 30, 2018).

[9] Sprint Relay Store, Sprint, https://sprintrelaystore.com/index.php (last visited Apr. 30, 2018). This offering is supplemented by the Sprint Vision Store, which has been developed for customers with

members, including disabled veterans and Gold Star family members, the benefits of an unlimited plan at a discounted price.[10] The company makes available other data-only service offerings to its customers as well. To assist customers with these and other plans, T-Mobile offers accessibility support and provides separate resources tailored to customers with varying challenges and needs.[11]

Rural and regional wireless providers are likewise offering service plans that can be valuable to consumers with a variety of needs. Appalachian Wireless, for example, recently launched a new unlimited data plan[12] and offers unlimited talk and text with no contract at a variety of price points.[13] Bluegrass Cellular likewise offers an unlimited data plan, which includes unlimited talk, text, and data, HD video streaming, and unlimited mobile hotspots.[14] GCI's Simply Unbeatable plan offers customers the convenience of unlimited data on every line, and prices per line are reduced as additional lines are added to the account.[15] U.S. Cellular offers two messaging-only plans starting at $30 per month, which are suited for customers with hearing

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vision loss and features audio prompts and descriptions to assist consumers. See Sprint Vision Store, Sprint, https://pcsorders.sprint.com/accessibilitystore/?ECID=Vanity:vision (last visited Apr. 30, 2018).

[10] T-Mobile ONE Military, T-Mobile, https://www.t-mobile.com/offers/military-phone-plans (last visited Apr. 30, 2018).

[11] T-Mobile Accessibility, T-Mobile, https://www.t-mobile.com/customers/accessibility-policy (last visited Apr. 30, 2018).

[12] Unlimited Data, Appalachian Wireless, https://www.appalachianwireless.com/?page=unlimited_data (last visited Apr. 30, 2018).

[13] Forward Pay, Appalachian Wireless, https://www.appalachianwireless.com/?page=apay (last visited Apr. 30, 2018).

[14] Bluegrass Unlimited, Bluegrass Cellular, https://bluegrasscellular.com/shop/plans/bluegrass-unlimited (last visited Apr. 30, 2018).

[15] Unlimited Data on Every Line!, GCI, https://www.gci.com/wireless/plans/simply%20unbeatable (last visited Apr. 30, 2018).

and speech impairments.[16] And SouthernLINC's unlimited plans include unlimited regional data and messaging,[17] and unlimited text and picture messaging plans are available for less than $20 per month.[18] Brands like Metro PCS and Cricket Wireless also offer unlimited plans, with offerings from the two companies priced at $50 per month and $60 per month, respectively.

Prepaid Options. Given that a significant portion of people with disabilities and older adults are low-income or have fixed income, the variety of low-cost and prepaid services plans offered by wireless service providers can be beneficial. For instance, TracFone offers prepaid smartphone plans starting as low as $15 per month for 200 minutes, 500 texts, and 500 MBs of data, as well as pay-as-you-go offerings for as little as $10 per month for 30 minutes of talk, text, and web services, which can provide consumers with disabilities a low-cost option in case of emergencies.[19] Bluegrass Cellular offers prepaid plans with unlimited talk and text and varying data speeds that range from $20-$60 per month.[20] SouthernLINC subscribers can take advantage of prepaid monthly unlimited plans for only $50/line, which offer unlimited talk, text, and web

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[16] Messaging-Only Plans, U.S. Cellular, https://www.uscellular.com/plans/text-only.html (last visited Apr. 30, 2018).

[17] Service Plans, Southern LINC, https://www.southernlinc.com/service-plans/simplelinc/month-to-month.aspx (last visited Apr. 30, 2018).

[18] Text Messaging, Picture Messaging & Web Browsing, Southern LINC, https://www.southernlinc.com/addons/texting-pictures-web.aspx (last visited Apr. 30, 2018).

[19] Service Plans, TracFone, https://www.tracfone.com/serviceplan/smartphone (last visited Apr. 28, 2018).

[20] Keep it Simple with Prepaid, Expanded, Bluegrass Cellular, https://bluegrasscellular.com/2017/promo/prepaid-expanded (last visited Apr. 28, 2018).

browsing.[21] Additionally, U.S. Cellular's prepaid offerings include plans with unlimited text messaging and voice for less than $60 per month.[22]

Accessibility- and Senior-Specific Service Plans. While consumers with disabilities can choose among a wide variety of service offerings available to the general population that will meet their needs, wireless providers also offer service plans specifically designed for consumers with disabilities and seniors. For example, AT&T's unlimited accessibility plans provide unique plan options tailored to the way an individual communicates, with discounts as compared to traditional unlimited data plans.[23] Sprint also offers a data-only plan specifically for customers with speech disabilities, which includes unlimited e-mail, Internet access, and messaging, but blocks incoming calls.[24] Several companies also provide plan offerings specific to seniors, such as T-Mobile's ONE Unlimited 55^{+},[25] AT&T's Senior Nation Plan,[26] and Consumer Cellular's low-cost options and AARP member discounts.[27] These plans are typically prepaid and include fewer minutes and extras (*e.g.*, music or video streaming services) than standard plans, which help seniors stay connected at a low cost and without the full suite of features and services that

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[21] Prepaid Plans, Southern LINC, https://www.southernlinc.com/service-plans/prepaid/prepaid-unlimited-monthly.aspx (last visited Apr. 28, 2018).

[22] Prepaid Plans, U.S. Cellular, https://www.uscellular.com/uscellular/plans/showPlans.jsp?plan-selector-type=prepaid&type=plans#listing (last visited Apr. 28, 2018).

[23] View AT&T Wireless Accessibility Plans, AT&T, https://www.att.com/esupport/article.html#!/wireless/KM1207491 (last visited May 1, 2018).

[24] Data-Only Plans, Sprint, https://www7.sprint.com/landings/accessibility/speech_dp.html (last visited Apr. 27, 2018).

[25] ONE Unlimited 55+, T-Mobile, https://www.t-mobile.com/offers/t-mobile-one-unlimited-55 (last visited May 1, 2018).

[26] Change to AT&T Senior Nation plan, AT&T, https://www.att.com/esupport/article.html#!/wireless/KM1009134 (last visited May 1, 2018).

[27] Plans, Consumer Cellular, https://www.consumercellular.com/Plans (last visited May 1, 2018).

may go unused. In short, these plans offer seniors and members of the accessibility community the ability to pay only for the services they want and need.

Feature-Phone Service Plans. Many service providers also offer service plans specifically for consumers who connect through feature phone devices who may need low-cost, basic connectivity or who may not want or need the functionality of a smartphone device or service option. Verizon, for example, offers its Single Basic Phone Plan, with unlimited talk and text plus 500 MB of data for just $30 per month.[28] AT&T similarly offers a $30-per-month plan that includes unlimited text, picture, and video messages and unlimited calling in the U.S.[29] Cricket Wireless offers unlimited calls and texts across the nation for $25 per month.[30] Republic Wireless and Project Fi also offer customers low-cost services relying predominantly on Wi-Fi networks, featuring unlimited minutes and messages for $15 and $20 per month, respectively.[31]

B. The Wireless Industry Continues To Develop Innovative Devices And Applications With Consistent Accessible Features That Consumers Can Customize to Meet Their Needs.

The Commission's implementation of a flexible regulatory framework under the CVAA has enabled the wireless industry to continue innovating and offering new capabilities that have greatly benefitted the accessibility community. Notably, the smartphone era that began just before the passage of the CVAA has resulted in mobile wireless products that are both consistent and customizable, enabling people with disabilities and seniors to establish basic expectations of

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[28] Single Basic Phone Plan, Verizon, https://www.verizonwireless.com/plans/single-device-plan/ (last visited Apr. 27, 2018).

[29] $30 Monthly Plan, AT&T, https://www.att.com/shop/wireless/plans/voice/sku7510770.html (last visited Apr. 27, 2018).

[30] Cell Phone Plans: Unlimited Talk & Text + Data Access, Cricket Wireless, https://www.cricketwireless.com/cell-phone-plans (last visited Apr. 27, 2018).

[31] *See* Cell Phone Plans, Republic Wireless, https://republicwireless.com/cell-phone-plans/ (last visited Apr. 27, 2018); Plan Features, Google Project Fi, https://fi.google.com/about/plan/ (last visited Apr. 27, 2018).

functionality while modifying the look, feel, and operations to meet unique needs. With a solid foundation of consistent and customizable devices, the pool of accessible mobile wireless products, capabilities, and application options identifiable to, operable by, and useful to seniors and people with disabilities has only continued to grow since the Commission's last report.

1. Mobile wireless products and applications continue to revolutionize access to Internet-based communications and opportunities for people who are blind or low-vision.

Wireless Handset Functionalities. Manufacturers and third-party app developers continue to develop and improve devices, software, and applications that provide features useful to individuals who are blind or low-vision. In particular, smartphones have become an important, if not indispensable, tool for people who are blind or visually impaired by including standard features that control mobile wireless devices through voice-command or describe visual content through audible communications, including messages, buttons, keys, and clickable links or images.

Many smartphone users can use Google's TalkBack feature, which allows users who are blind or visually impaired to browse the web through the use of synthesized speech outputs. For instance, the TalkBack feature on Samsung, HTC, and Sony devices can read aloud text that is displayed on the screen, as well as activate motion controls so that users can control their devices using hand gestures.[32] Additionally, Apple's iPhones feature VoiceOver, a screen reading technology that enables users to better understand what is being displayed on their screens even

[32] Mobile Accessibility : Technology Accessible to Everyone : Vision, Samsung, http://www.samsung.com/latin_en/mobileaccessibility/#vision (last visited Apr. 27, 2018); TalkBack, HTC 10, HTC, https://www.htc.com/us/support/htc-10/howto/navigating-your-phone-with-talkback.html (last visited Apr. 27, 2018); TalkBack, Sony Mobile, https://support.sonymobile.com/global-en/xperiaz3compact/userguide/talkback/ (last visited Apr. 27, 2018).

if they cannot see it, through the use of image recognition and aural descriptions.[33] VoiceOver includes numerous features useful to people with vision impairments, such as a Braille keyboard, pronunciation editor, audio descriptions, display accommodations, font adjustments, magnifier, and a speak screen.

Wireless devices also offer a variety of other functionalities for consumers who are blind or low-vision. LG, for example, allows users to change their phone theme or home screen to customize how the phone looks and functions; turn on Comfort View, which reduces certain lighting in low ambient light conditions; use bold text; or choose to invert colors to reduce eye strain and improve visibility.[34] Samsung, too, offers a variety of applications and phone features to simplify operation for individuals with vision impairments. Samsung's easy or standard mode, which configures the home screen to provide a simple layout and larger fonts, is particularly useful for simplifying the user experience for people with vision impairments and elderly users, and Samsung smartphones allow font size and color adjustment, as well as magnification. S Voice is a hands-free function that reads messages aloud and enables users to use voice commands to respond to messages or answer calls.[35] The HTC 10 likewise has features such as improved screen readability, particularly for those with low vision, through the use of increased font and display size, color inversion, color corrector, magnification, and

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[33] Accessibility, Apple, https://www.apple.com/accessibility/iphone/vision/ (last visited Apr. 30, 2018).

[34] *See, e.g.*, LG G2 User Guide: Vision, Sprint, http://eguides.sprint.com/support/eguides/lgg2/index.html#lg_g2_ug/accessibility.html (last visited Apr. 30, 2018).

[35] Mobile Accessibility – Vision, Samsung, http://www.samsung.com/latin_en/mobileaccessibility/#vision (last visited May 1, 2018).

automatic screen rotation.[36] And Sony's newest mobile devices also provide magnification gestures and text-to-speech outputs that are useful to people who are blind or have vision limitations.[37]

Apple iPhone users also can enable Select to Speak, so that the phone speaks selected items on the screen; control the sound using a single headphone; and turn on unread notification reminders so that the phone will play a sound or vibrate on intervals to remind users of unread notifications.[38]

Personal Assistants. The recent wave of personal assistants included in smartphones not only provides additional hands-free convenience for all users of wireless devices, but also greatly increases device accessibility for users with vision impairments. Since the introduction of Siri in 2011, adoption of personal assistants has grown exponentially, with more assistants and greater capabilities coming to market each year. By 2020, ComScore predicts that 50 percent of all searches will be voice searches,[39] and a 2017 report showed that 42 percent of U.S. smartphone owners now use AI-based personal assistants an average of 10 times per month.[40] People with disabilities, however, rely on digital personal assistants more frequently than the average

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[36] HTC 10 Accessibility Features, HTC, https://www.htc.com/us/support/htc-10/howto/accessibility-features-of-your-phone.html (last visited May 1, 2018).

[37] *See, e.g.*, Magnification Gestures, Sony, https://support.sonymobile.com/global-en/xperiaz3compact/userguide/magnification-gestures/#gref (last visited Apr. 25, 2018) (providing information regarding magnification gestures for its Xperia Z3 Compact device).

[38] Accessibility, Apple, https://www.apple.com/accessibility/iphone/vision/ (last visited Apr. 30, 2018).

[39] Christi Olson, *Just say it: The future of search is voice and personal digital assistants*, CAMPAIGN (Apr. 25, 2016), https://www.campaignlive.co.uk/article/just-say-it-future-search-voice-personal-digital-assistants/1392459.

[40] Bret Kinsella, *42 Percent of US Smartphone Owners Use AI Personal Assistant Monthly*, VOICEBOT.AI (July 28, 2017 9:25 AM), https://www.voicebot.ai/2017/07/28/42-percent-us-smartphone-owners-use-ai-personal-assistant-monthly/.

population, because of the variety of hands-free tasks that they can help users perform. Apple's Siri,[41] Samsung's Bixby,[42] Microsoft's Cortana,[43] Amazon's Alexa,[44] and Google Assistant[45] can all read and send text messages, make emergency calls through voice-activation, and perform numerous other tasks for the user through simple vocal prompts. Personal assistants can help users who are blind perform tasks in a matter of seconds that could otherwise take five or ten minutes, and allow users to access and understand websites that were otherwise completely inaccessible to their screen-reading software.[46]

Personal assistants have become increasingly more responsive, can be used to control many aspects of the device, and work in concert with other applications to provide a more accessible user experience. The impact of personal assistants reaches far outside the phone screen, enabling people with disabilities to more easily use navigation software, purchase items, control connected home appliances, and perform a multitude of other tasks.

Third-Party Applications. A variety of third-party applications also exist to help consumers who are blind or visually impaired meet other specific needs. Relúmĭno, a revolutionary vision-enhancing app, allows people with visual impairments to comprehend the movements and the facial expressions of a live performance.[47] Cydalion, by Float, is an assistive

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41 Siri, Apple, https://www.apple.com/ios/siri/ (last visited May 1, 2018).

42 Bixby, Samsung, https://www.samsung.com/us/explore/bixby/ (last visited May 1, 2018).

43 Cortana, Microsoft, https://www.microsoft.com/en-us/cortana (last visited May 1, 2018).

44 Amazon Alexa, Amazon, https://developer.amazon.com/alexa (last visited May 1, 2018).

45 Google Assistant Overview, Google, https://assistant.google.com/#?modal_active=none (last visited May 1, 2018).

46 *What virtual assistants mean for accessibility*, CREATIVE BLOQ (Mar. 6, 2015), https://www.creativebloq.com/web-design/what-virtual-assistants-mean-accessibility-31514357.

47 Relúmĭno works in conjunction with the Gear VR headset to enhance vision, and for a more comfortable and streamlined appearance, Samsung recently debuted its own Relúmĭno Glasses at the 2018 CES Show in Las Vegas. David Nield, *Samsung's Relúmĭno glasses bring smarter vision for*

navigation app that can help people with visual impairments detect objects. Users hold up the phone and the app informs the user, through audio and haptic feedback, if there is an obstacle in their way and lets the user know whether the object is high or low.[48] Additionally, Microsoft's Color Binoculars App helps infuse the real world with color for users who experience several common types of color blindness.[49] And an app called Glimmer that was released last year aims to create a more inclusive online dating environment for people with varying disabilities, allowing users to be transparent about the daily challenges they face.[50]

Applications supported by enhanced location services are providing people who are blind or visually impaired with new levels of independence.[51] For example, BlindWays combines GPS data with special cues to assist an individual in getting to the exact location of a bus stop. As the user gets closer to the bus stop, the phone buzzes differently.[52] Another useful app, Be My Eyes,[53] fosters interaction and collaboration between the vision-impaired and sighted communities. This free app, available on iOS and Android, connects blind and low-vision users with sighted volunteers and company representatives for visual assistance through a live video

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partially sighted people, NEW ATLAS (Jan. 2, 2018), https://newatlas.com/samsung-relumino-glasses/52795/.

48 About Cydalion, Cydalion, http://cydalion.com/ (last visited May 2, 2018).

49 Jessica Conditt, *Microsoft's iOS App Augments Hues for Color-Blind Folks*, ENGADGET (Nov. 11, 2016), https://www.engadget.com/2016/11/11/color-binoculars-color-blind-app-free-ios/.

50 Kirsten King, *A New App Just Launched To Make Online Dating More Inclusive For People With Disabilities*, BUZZFEED NEWS, (Jan. 26, 2017), https://www.buzzfeed.com/kirstenking/a-new-app-just-launched-to-make-online-dating-more-inclusive?utm_term=.ppG1e1vKw#.tbmwBw4Mk.

51 *See* Section II.C, *infra*.

52 Skip Descant, *Technology Guides Blind Transit Riders Right to the Bus Door*, GOVTECH.COM (Apr. 13, 2018), http://www.govtech.com/fs/transportation/Technology-Guides-Blind-Transit-Riders-Right-to-the-Bus-Door.html (explaining that "Bluetooth technology, crowdsourcing, and connected devices are making mobility easier for blind, visually impaired or disabled transit riders).

53 How It Works, Be My Eyes, https://www.bemyeyes.com/ (last visited May 2, 2018).

call.[54] Similarly, the Aira app connects an individual with a sighted person who delivers visual assistance to a user's smartphone connected to video-equipped smart glasses. Aira can sort mail and medications, color match clothes, locate a stadium seat, locate elevators, or explore a new city and roam historic sites.[55]

Other mobile applications are also beginning to adopt to the unique needs of their users. For example, Uber, known for its ride-sharing and food delivery services, also has accessible features and capabilities. For individuals who are blind or low-vision, Uber's app can be used with iOS and Android accessibility features including VoiceOver, TalkBack, and wireless Braille display compatibility.[56] Social media platforms are also becoming increasingly accessible. For instance, Facebook and Twitter offer VoiceOver and text size and color contrast adjustment settings.[57]

2. Wireless manufacturers, service providers, and third-party application developers are offering numerous features to assist consumers who are hearing-impaired or deafblind.

The wireless industry continues to develop and improve products, services, and applications that meet the needs of consumers who are deaf, hard-of-hearing, or deafblind.

Hearing Aid Compatibility (HAC). Today, consumers have available a wide array of HAC-compliant wireless handsets. Indeed, the wireless industry continues to exceed the

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54 *Id.*

55 Why Choose Aira, Aira, https://aira.io/#why_choose_aira (last visited May 2, 2018).

56 *Accessibility at Uber*, Uber, https://accessibility.uber.com/ (last updated Mar. 16, 2018).

57 *See* Accessibility and Facebook, AFB, http://www.afb.org/info/living-with-vision-loss/using-technology/using-social-media-with-a-visual-impairment-or-blindness-facebook-twitter-and-linkedin/accessibility-and-facebook/1235 (last visited May 2, 2018); Accessibility and Twitter, AFB, http://www.afb.org/info/living-with-vision-loss/using-technology/using-social-media-with-a-visual-impairment-or-blindness-facebook-twitter-and-linkedin/accessibility-and-twitter/1235 (last visited May 2, 2018).

Commission's minimum HAC requirements for wireless handsets. In 2017, the last year for which data is available, more than 88 percent of mobile handsets offered by U.S. service providers met the Commission's M-rating requirements, and 83 percent met both the M- and T-rating requirements on an air interface basis.[58] Compare that to 2014, when more than 83 percent of mobile handsets offered by U.S. service providers met the Commission's M-rating requirements, and 66 percent met both the M- and T-rating requirements.[59] The ability of wireless providers to offer such devices is a result of the commitment by wireless handset manufacturers to ensuring their devices are HAC-compliant. Hundreds of devices are available from wireless handset manufacturers such as HTC, LG, Motorola, Apple, Nokia, Kyocera, and Samsung, at a variety of price points and with various additional functionalities to serve the needs of consumers.[60]

Additionally, the wireless industry has made available myriad resources regarding the ways in which consumers can find and learn about HAC-rated handsets and the HAC rating

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[58] *FCC Wireless Telecommunications Bureau, Service Provider Handset Totals by Air Interface, Reporting Period From: January 1, 2017 - December 31, 2017*, FCC, https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0322/DOC-349837A1.pdf.

[59] *FCC Wireless Telecommunications Bureau, Service Provider Handset Totals by Air Interface, Reporting Period From: January 1, 2014 – December 31, 2014*, FCC, https://apps.fcc.gov/edocs_public/attachmatch/DOC-331991A1.pdf.

[60] *See FCC Device Manufacturers List of All Handsets Offered by Manufacturers – Reporting Period: July 1, 2015-June 30, 2016*, FCC, https://apps.fcc.gov/edocs_public/attachmatch/DOC-341019A1.pdf. As just one example, all devices sold by Kyocera in the U.S. are HAC-compliant. Accessibility Solutions, Kyocera, https://www.kyoceramobile.com/accessibility/ (last visited Apr. 27, 2018).

system. For example, wireless service providers[61] and manufacturers[62] offer company-specific HAC webpages and in-store testing, and CTIA hosts such information on its AccessWireless.org website. Consumers likewise can obtain such information through the Commission's Accessibility Clearinghouse and consumer guides, at consumer group events and via advocacy group online resources, and through hearing aid manufacturers and audiologists that develop and fit hearing aids and cochlear implants for consumer use. Given all of these available resources, the Commission should highlight in its report to Congress that it is looking to eliminate the HAC

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[61] *See, e.g.*, Carolina West Wireless, *HAC Information*, https://www.carolinawest.com/hac-information (last visited Apr. 27, 2018); GCI, *Hearing Aid Compatibility*, https://www.gci.com/wireless/phones-devices#compare (last visited Apr. 27, 2018); Southern Linc, *HAC FAQs & HAC Ratings*, https://www.southernlinc.com/privacy/wireless-accessibility/hac-ratings.aspx (last visited Apr. 27, 2018); T-Mobile, *About T-Mobile – Accessibility Policy*, https://www.t-mobile.com/company/company-info/consumer/accessibility-policy.html (last visited Apr. 27, 2018); U.S. Cellular, *Hearing Aid Compatibility & Accessibility*, https://www.uscellular.com/uscellular/services/hearing-aid.jsp (last visited Apr. 27, 2018); Verizon, *Accessibility – Hearing aid compatibility*, http://www.verizon.com/about/accessibility/hearing-aid-compatibility (last visited Apr. 27, 2018); Appalachian Wireless, *Hearing Aid Compatibility Chart*, http://www.appalachianwireless.com/?page=hacinfo (last visited Apr. 27, 2018); Bluegrass Cellular, *Hearing Aid Compatibility*, https://bluegrasscellular.com/support/hac (last visited Apr. 27, 2018); AT&T, *View Hearing Aid Compatible Wireless Phones*, https://www.att.com/esupport/article.html#!/wireless/KM1207494 (last visited Apr. 27, 2018); *see also* 47 C.F.R. § 20.19(h) (requiring service providers to display certain information about HAC and their handsets on publicly accessible websites).

[62] *See, e.g.*, Hearing Aid Compatible Phones, LG, http://www.lg.com/us/accessibility/mobile/accessibility-hacphones (last visited Apr. 27, 2018); About Hearing Aid Compatibility requirements for iPhone, Hearing Aid Compatibility, HTC, https://www.htc.com/us/accessibility/hearing-aid-compatibility/ (last visited Apr. 27, 2018); Apple, https://support.apple.com/en-us/HT202186 (last visited Apr. 27, 2018); Mobile Accessibility – Hearing, Samsung, http://www.samsung.com/latin_en/mobileaccessibility/#hearing (last visited Apr. 27, 2018); *see also* 47 C.F.R. § 20.19(h) (requiring manufacturers to display certain information about HAC and their handsets on publicly accessible websites).

Form 655 filing requirement for wireless service providers[63] – a proposal that CTIA fully supports.[64]

Wireless handset manufacturers and service providers remain committed to ensuring that consumers have access to hearing aid compatible wireless handsets. As the Commission is aware, the wireless industry and accessibility community have committed to developing a HAC Consensus Task Force to assess whether a 100 HAC-compliance requirement is achievable considering technical and market conditions.[65] CTIA and the wireless industry have engaged with associations representing consumers with hearing loss to begin the process of setting up a task force for such exploration,[66] and we look forward to continuing that engagement in the coming months and years.

Other Wireless Handset Functionalities. Aside from the myriad HAC-compliant wireless handsets available, wireless handset manufacturers are also making available a variety of features on their devices that help meet the needs of consumers who are deaf or hard of hearing. Samsung phones, for example, offer many sound customization options to assist with auditory challenges. These options include sound balancing that enables the user to adjust the

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63 *See Revisions to Reporting Requirements Governing Hearing-Aid Compatible Mobile Handsets*, Notice of Proposed Rulemaking, 32 FCC Rcd 7863 (2017).

64 *See* Comments of CTIA and Competitive Carriers Association, WT Docket No. 17-228 (filed Nov. 13, 2017); Reply Comments of CTIA and Competitive Carriers Association, WT Docket No. 17-228 (filed Nov. 27, 2017).

65 *See, e.g.*, *Improvements to Benchmarks and Related Requirements Governing Hearing Aid-Compatible Mobile Handsets*, Report and Order, 31 FCC Rcd 9336 (2016) (establishing benchmarks for service providers and manufacturers to achieve 66 percent and 85 percent HAC compliance over a multi-year period and establishing the HAC Consensus Task Force).

66 *See* Letter from Competitive Carriers Association, CTIA, Hearing Loss Association of America, National Association of the Deaf, Telecommunications for the Deaf and Hard of Hearing, and Telecommunications Industry Association, to Marlene H. Dortch, FCC, WT Docket No. 15-285 (filed Jan. 11, 2018) (providing a discretionary update on the status of the HAC Consensus Task Force).

volume in one ear but not the other, which is targeted at people with different hearing aids; flickering flash notifications to inform users of incoming calls or texts; mono audio that converts stereo sound into mono sound to make sure users catch all sounds on both channels; and the ability to turn off all sound and create complex vibration patterns.[67] Additionally, Apple's innovative Bluetooth technology supports Made for iPhone hearing aids and cochlear implants.[68] Apple iPhones also enable visible and vibrating alerts and closed captioning. People with hearing impairments can also use personal assistants to send text messages and perform other tasks.[69] Finally, many devices also include haptic feedback for tactile cues that directly benefit people with hearing-related impairments.[70]

Service Provider and Third-Party Applications. Mobile applications have proven to be a very helpful tool in enabling people with hearing impairments to communicate and navigate their environments safely. For instance, the RogerVoice app helps people who are deaf communicate by phone by providing a real-time visual script – similar to subtitles – of what the individual on the other end of the phone is saying.[71] BRACI is a new and innovative sound recognition platform that recognizes and analyzes sounds from a user's environment and converts those sounds into visual and sensory notifications and alerts.[72] Uber offers vibration capabilities and

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67 Mobile Accessibility : Technology Accessible to Everyone : Hearing, Samsung, http://www.samsung.com/uk/mobileaccessibility/#hearing (last visited Apr. 27, 2018).

68 Accessibility, Apple, https://www.apple.com/accessibility/iphone/hearing/ (last visited May 2, 2018).

69 *See* Section I.B.1, *supra*.

70 *See, e.g.*, Human Interface Guidelines, Apple, https://developer.apple.com/ios/human-interface-guidelines/user-interaction/feedback/ (last visited May 2, 2018); Android A to Z: Haptic Feedback, AndroidCentral, https://www.androidcentral.com/android-z-haptic-feedback (last visited May 2, 2018).

71 How it Works, RogerVoice, https://rogervoice.com/en/home (last visited May 2, 2018).

72 Braci Smart Ear, Braci, http://www.braci.co/ (last visited May 2, 2018).

in-app non-verbal communication settings for deaf and hard-of-hearing riders that use its ride-sharing services.[73] Service providers similarly provide applications to benefit consumers who are deaf, hard of hearing, or deafblind. Sprint, for instance, offers the IP Relay mobile app, which works in conjunction with Braille device manufacturer Humanware to accommodate the needs of members of the deafblind community.[74] Registration and identity verification is available in-app, the app is constantly updated through user feedback, and it was designed with input from members of the deafblind community.[75]

HD Voice. Many wireless service providers support enhanced calling and high-definition (HD) Voice.[76] AT&T, for example, covers more than 320 million POPs with its Voice Over LTE (VoLTE) network, and automatically includes HD Voice for all VoLTE-capable devices for post-paid customers.[77] Verizon likewise has VoLTE fully deployed over its network.[78] Both

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[73] *See* Accessibility At Uber, Uber, https://accessibility.uber.com/ (last visited May 2, 2018).

[74] Sprint IP Relay, Sprint, https://www.sprint.com/en/shop/services/accessibility/services.html#sprint-ip-relay (last visited May 2, 2018).

[75] *Id.*

[76] *See, e.g.*, HD Voice, Verizon, https://www.verizonwireless.com/solutions-and-services/hd-voice/ (last visited Apr. 27, 2018); HD Voice, AT&T, https://www.att.com/shop/wireless/features/hd-voice.html (last visited Apr. 27, 2018); FAQs About HD Voice, Sprint, https://www.sprint.com/en/support/solutions/device/faqs-about-hd-voice-from-sprint.html (last visited Apr. 27, 2018); T-Mobile network bands & technologies, T-Mobile, https://support.t-mobile.com/docs/DOC-4988 (last visited Apr. 27, 2018); Enhanced Calling, U.S. Cellular, https://www.uscellular.com/4g/enhanced-calling-hd-voice-data/index.html (last visited Apr. 27, 2018); HD Calling, Bluegrass Cellular, https://bluegrasscellular.com/support/volte (last visited Apr. 27, 2018); HD Voice, Cricket Wireless, https://www.cricketwireless.com/support/apps-and-services/hd-voice/customer/hd-voice.html (last visited Apr. 27, 2018).

[77] *See* Monica Alleven, *Editor's Corner—Hear ye, hear ye: Does voice have a role in 5G?*, FIERCE WIRELESS (Feb. 22, 2018), https://www.fiercewireless.com/wireless/editor-s-corner-hear-ye-hear-ye-does-voice-have-a-role-5g.

[78] *Id.*

smartphones and feature phones are available on certain HD Voice networks,[79] and service providers such as Bluegrass Cellular also offer resources to consumers about how HD Voice works and how to enable it on compatible devices.[80] When HD Voice is enabled and HD Voice-capable devices are used in supported areas, the user's voice call services are greatly enhanced. This is beneficial for all consumers generally, and improves call clarity for people with hearing-related disabilities in particular.

3. Wireless manufacturers, service providers, and application developers offer features that make communications easier for consumers with physical or dexterity-related challenges.

The wireless industry also continues to develop and improve innovative features that assist individuals with physical and dexterity-related limitations.

Wireless Handset Functionalities. Manufacturers have taken significant steps to build voice controls and assistive tactile functions into their devices. Dictation software, prominent on many devices, allows users to speak what they want to write. Personal assistants are also helpful to users with motor limitations because they can carry out a user's voice commands, without requiring users to complete complicated manual tasks. For example, for users who cannot use a mouse or touch screen controls, navigating a website using the keyboard can often be a cumbersome experience; a voice-activated assistant can take such users where they need to go

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[79] *See, e.g.*, All Basic Phones, Verizon, https://www.verizonwireless.com/basic-phones/ (last visited May 2, 2018); AT&T Cingular Flip 2, AT&T, https://www.att.com/cellphones/att/cingular-flip-2.html# (last visited May 2, 2018); Alcatel GO Flip, T-Mobile, https://support.t-mobile.com/community/phones-tablets-devices/basic-phones/alcatel-go-flip (last visited May 2, 2018).

[80] HD Calling, Bluegrass Cellular, https://bluegrasscellular.com/support/volte (last visited Apr. 27, 2018).

with ease.[81] Additionally, Apple's Switch Control can allow a user to fully interact with an iPhone without touching it.[82]

Many devices also offer a simplified single-touch experience. Samsung's new devices, for example, have an "easy touch" mode, which enables the user to stop or snooze alarms, calendar events, and timer alerts, and to accept or reject incoming calls, simply by touching the phone.[83] LG offers Touch Assistant, one-handed operation, and split keyboard functionality, and numerous other accessibility settings.[84] Other examples include HTC's Motion Launch feature, which combines motion gestures followed by a finger gesture, allowing users to perform tasks such as unlocking the home screen through a combination of simple gestures,[85] and Sony's one-handed operations mode on its newer devices.[86] Additionally, Apple's Assistive Touch lets users adapt the multi-touch screen to the individual's physical needs, and supports third-party keyboards and keyboard shortcuts.[87] Additionally, last year, Microsoft developed a smartphone

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81/ *What virtual assistants mean for accessibility*, CREATIVE BLOQ (Mar. 6, 2015), https://www.creativebloq.com/web-design/what-virtual-assistants-mean-accessibility-31514357.

82 Use Switch Control to navigate your iPhone, iPad, or iPod touch, Apple, https://support.apple.com/en-us/HT201370 (last visited May 2, 2018).

83 Mobile Accessibility: Technology Accessible to Everyone, Samsung, http://www.samsung.com/uk/mobileaccessibility/#dexterity (last visited May 2, 2018).

84 LG Android Phone Accessibility Features, LG, http://www.lg.com/us/accessibility/mobile/how#motor (last visited May 2, 2018).

85 Mobile Accessibility: Technology Accessible to Everyone : Dexterity, Samsung, https://www.htc.com/us/support/htc-10/howto/what-is-motion-launch.html#GUID-87BACB53-AC24-49E0-8725-37878A6E24DD (last visited May 2, 2018).

86 Navigating Applications, Sony, https://support.sonymobile.com/global-en/xperiaxa1ultra/userguide/navigating-applications/#gref (last visited May 2, 2018) (scroll to "one-handed operations" at the bottom of the page).

87 Accessibility, Apple, https://www.apple.com/accessibility/iphone/physical-and-motor-skills/ (last visited May 2, 2018).

app that interprets eye signals and translates them into letters, allowing people with motor neurone disease, also known as Lou Gehrig's disease or ALS, to communicate with others.[88]

Third-Party Applications. Among third-party applications, a notable development is Google's recent addition of wheelchair accessible navigation directions to its popular Google Maps app.[89] AccessNow utilizes a constantly updating crowd-sourced database of buildings and establishments with ratings and information about their accessibility features.[90] Wheelchair manufacturer WHIL also developed an iPhone app that allows a person with limited mobility to remotely operate a wheelchair (*e.g.*, move it out of the way while not in use).[91] And UberWAV helps connect individuals in wheelchairs with wheelchair accessible ride-sharing vehicles.[92]

4. Wireless devices and applications offer cognition-related features to make using wireless service and devices as straightforward as possible.

Wireless Handset Functionalities. Since 2016, the wireless industry continues to develop more products and services to benefit individuals with cognitive and learning disabilities,[93] providing a large number of devices that are useful for increasing independence,

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88 Anthony Cuthbertson, *Smartphone App Helps ALS Sufferers Speak With Their Eyes*, NEWSWEEK (Feb. 21, 2017), http://www.newsweek.com/smartphone-app-helps-als-sufferers-speak-their-eyes-559051.

89 Shiva Thiagarajan and Rio Akasaka, *Building a Map for Everyone*, GOOGLE, (July 6, 2017), https://www.blog.google/products/maps/building-map-everyone/.

90 App Store Preview: AccessNow, Apple iTunes, https://itunes.apple.com/ca/app/accessnow/id1162504545?mt=8 (last visited May 2, 2018).

91 Model A is More Than Just Mobility – It's Freedom, WHILL, http://whill.us/model-a-personal-mobility-device-personal-ev/ (last visited May 2, 2018).

92 UberWAV, Uber, https://www.uber.com/ride/uberwav/ (last visited May 2, 2018).

93 *See* FCC, INDIVIDUALS WITH COGNITIVE DISABILITIES: BARRIERS TO AND SOLUTIONS FOR ACCESSIBLE INFORMATION AND COMMUNICATION TECHNOLOGIES (Oct. 6, 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-341628A1.pdf (highlighting a number of accessibility features that can help people with cognitive disabilities to use existing information and communications technologies, and recommending ways to ensure accessible technology continues to be made available for this community, including recommendations around universal design, consumer outreach and training, industry education, and customer service employee training).

creating additional educational opportunities, and fostering greater civic participation.[94] For example, manufacturers continue to market smartphone-tablet hybrids (phablets), which are particularly useful to individuals with limited dexterity who may have a difficult time operating traditional smartphones. Phablets offer all the functionality of a smartphone, but have larger display screens.[95] Samsung Galaxy Note 8, Google Pixel 2 XL, and iPhone 8 Plus are examples of currently available phablets.[96]

Manufacturers also continue to develop devices with functional capabilities that can address the needs of individuals with specific cognitive impairments. Biometric solutions such as fingerprinting or eye scans to operate devices can be found across iPhone and Android devices[97] and are useful to people who have difficulties remembering passwords. Additionally, all of the manufacturers' personal assistants can respond to various inquiries and provide reminders useful to individuals with organizational limitations. Users can speak into the microphone or use the onscreen keyboard to ask questions, carry out certain tasks, request calendar or other reminder alerts, and even process certain information. Notably, Samsung's Bixby can help users by identifying landmarks and businesses through the camera lens and, after learning a user's routine, can make useful recommendations.[98]

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94 *Id*. at 5-7, 25.

95 *Id*. at 25.

96 Max Parker, *Best Phablets 2018: Top Phablets You Can Buy*, TRUSTED REVIEWS (Mar. 9, 2018), http://www.trustedreviews.com/guide/best-phablets.

97 *See, e.g.*, About Touch ID Advanced Security Technology, https://support.apple.com/en-us/HT204587 (explaining that Touch ID is "an easy way to use your fingerprint instead of a password for many common operations") (last visited May 2, 2018).

98 Bixby, Samsung, https://www.samsung.com/us/explore/bixby/ (last visited May 1, 2018).

With respect to assisting users with problem-solving and decision-making, devices are now equipped with various functions to provide a simplified interface design with one-step functionality. For instance, numerous phones, including those from LG and Samsung, feature easy modes, which allow users or their caregivers to streamline the device settings to minimize disruptions. Indeed, LG offers a user-friendly video explaining to consumers how to enable the functionality.[99]

Third-Party Applications. Mobile applications continue to be tools useful for people with cognitive and learning disabilities. For example, Book of You uses methods of reminiscence therapy using words, pictures, music, and film to create a story of who a person was and who they are now. This app is particularly helpful to people with dementia.[100] Additionally, Learn with Rufus is an app designed to help children with cognitive disabilities learn facial expressions, which can be customized to meet the needs of children with varying skills and abilities.[101]

5. Wireless devices and applications offer features tailored to the needs of seniors.

Many wireless products are designed with functionalities that can be particularly beneficial to seniors. For example, LG offers EasyHome Screen for beginners, with a simpler layout and larger font size.[102] Similarly, iOS VoiceOver and Samsung Galaxy's Easy Mode are

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[99] *See, e.g.*, EasyHome Screen, LG, http://www.lg.com/us/accessibility/mobile/how#video-36 (last visited Apr. 27, 2018).

[100] *What is a Book of You*, Book of You, https://www.bookofyou.co.uk/what-it-is/ (last visited May 2, 2018).

[101] Learn with Rufus:Emotions, GooglePlay, https://play.google.com/store/apps/details?id=com.rufusrobot.emotions&hl=en (last visited May 2, 2018).

[102] Using EasyHome on the LG G4, Android Central, https://www.androidcentral.com/using-easyhome-lg-g4 (last visited May 2, 2018).

particularly helpful for seniors to reduce clutter on their phone screens and improve usability. Settings such as adding frequently visited websites to the device's homepage or frequent contacts to a favorites list can similarly ensure a tailored, streamlined user experience.

Some devices are developed with the special needs of seniors in mind. Greatcall continues to develop and improve simple smartphones useful to seniors.[103] Greatcall's Jitterbug phones, specifically designed for seniors, feature a large screen, clear buttons, a long-lasting battery, and voice typing.[104] Greatcall also connects users to 5Star, which provides Urgent Response, Urgent Care, GreatCall Link, and MedCoach.[105]

6. Real-time text offers greater communications accessibility for a variety of users.

The wireless industry has already begun the roll-out of RTT, which benefits consumers with hearing- and speech-related disabilities by providing a more conversational communications experience. As the Commission is well aware, the wireless industry began introducing RTT at the end of 2017 following the Commission's determination that this next-generation service could serve in place of antiquated wireless TTY requirements. The first RTT-capable devices appeared on AT&T's, Verizon's, and T-Mobile's networks last year.[106] Other service providers may elect to deploy RTT in lieu of supporting wireless TTY, and wireless handset manufacturers

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103 *See* Greatcall Home, Greatcall, https://www.greatcall.com/ (last visited May 2, 2018).

104 Jitterbug Smart, Greatcall, https://www.greatcall.com/phones/jitterbug-smart-smartphone-for-seniors (last visited May 2, 2018).

105 5Star Urgent Response, Greatcall, https://www.greatcall.com/services-apps/5star-medical-alert-service/emergency-providers (last visited May 2, 2018).

106 *See* Accessibility Policy, T-Mobile, https://www.t-mobile.com/customers/accessibility-policy (last visited Apr. 27, 2018); Real-time Text, Verizon, http://www.verizon.com/about/accessibility/real-time-text (last visited Apr. 27, 2018); AT&T Real-Time Text, AT&T, https://www.att.com/esupport/article.html#!/wireless/KM1233824 (last visited Apr. 27, 2018).

are working to develop additional devices by the end of this year.[107] Indeed, LG, Apple, and Samsung are already working closely with nationwide wireless providers on these efforts, with the LG G6, Samsung Note 8, and the iPhone X, 8 Plus, 8, 7 Plus, 7, 6 Plus, and 6, each available on certain providers' networks. For its part, AT&T has developed an over-the-top application to deploy RTT on devices on its network, including devices supporting Android 4.4 or later as well as Apple devices with iOS 9.0 or later.

RTT is not just an update from outdated and underused wireless TTY technologies. It is a communications evolution that will enable consumers of a variety of abilities to conversationally engage without the need for specialized equipment or external plug-in devices. This rapid communication medium supports RTT-to-RTT calling, RTT-to-911 calling, and RTT-to-TTY calling. It can be beneficial during high-stress situations such as when contacting public safety responders to quickly relay critical information. It also allows users to take advantage of modern smartphone keyboards, meaning users can type in multiple languages, use emojis, or type symbols.

As RTT evolves and is deployed on additional carrier networks, the wireless industry is committed to continuing its dialogue with the accessibility community to ensure that this new functionality meets the needs of its users. The wireless industry is also continuing to engage with the public safety community to encourage adoption of next-generation networks that can support RTT functionality to the benefit of consumers of various needs across the country.

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[107] *See, e.g., Real-Time Text is Wireless Accessibility for the 21st Century,* CTIA (Feb. 12, 2018) http://www.ctia.org/news/real-time-text-is-wireless-accessibility-for-the-21st-century; *Half a Century Later – An Alternative to TTY,* AT&T (Dec. 11, 2017), https://www.attpublicpolicy.com/accessibility/half-a-century-later-an-alternative-to-tty/.

II. THE INTERNET OF THINGS AND NEXT-GENERATION 5G TECHNOLOGIES AND SERVICES ARE EXPECTED TO PROVIDE SUBSTANTIAL BENEFITS FOR THE ACCESSIBILITY COMMUNITY.

For the last ten years, the U.S. wireless industry has spent billions of dollars connecting more than 99 percent of Americans to LTE networks that enable fast, reliable communications. While efforts to close the digital divide in rural areas with 4G LTE continue, the wireless industry is also focusing its sights on connecting not just every*one*, but every*thing*.

Already, Internet of Things (IoT) devices and functionalities are improving the lives of consumers, including people with disabilities, from tracking wellbeing to fostering independence and improving public safety outcomes. With 5G, the U.S. wireless industry is poised to develop innovative technologies and services with an array of features and solutions that will further directly benefit all consumers, but may prove particularly useful to the accessibility community.

5G-enabled networks will be up to 100 times faster, reduce the delay that occurs when data is transmitted across distances, and support 100 times more devices than current networks – transforming not only wireless communications, but a variety of other industries to create an increasingly connected world. A 5G-connected world – lead by the efforts of the U.S. wireless industry – will be transformative, improving options for health care, education, transportation, public safety, and more.[108] CTIA therefore urges the Commission to recognize in its report to Congress the meaningful advancements that 5G technologies and networks can create for all consumers, including those with disabilities.

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[108] *See* Meredith Attwell Baker, *5G Global Race: How America Wins*, Fox Business (Mar. 21, 2018), https://www.foxbusiness.com/features/5g-global-race-how-america-wins; Tom Sawanobori, New 5G Standards Sharpen Need for More Spectrum & Modern Siting Rules, CTIA (Jan. 11, 2018), http://www.ctia.org/news/new-5g-standards-sharpen-need-for-more-spectrum-modern-siting-rules.

A. The Increased Speeds Of 5G Networks And Technologies Will Foster Advances In Education, Job Opportunities, And Independent Living.

Existing 4G LTE networks have enabled mobile broadband services, unleashing the app economy and the dynamism of mobile video, while inspiring myriad industries to harness the power of wireless – all to the benefit of people with disabilities. The next generation of wireless connectivity is expected to greatly increase wireless network speeds, allowing much more data to pass through the same busy networks without getting bottlenecked or delayed.[109] These faster speeds will enable applications and connectivity that will empower consumers across the country and create new benefits and daily efficiencies for the accessibility community.

Education. 5G networks will dramatically improve educational opportunities for Americans across the country, including those with disabilities, through augmented and virtual reality programs. Virtual reality and augmented reality can be used to assist people with autism through simulations designed to teach various practical skills. A virtual or simulated environment provides useful skills in a safe and controlled environment where people with autism can practice skills and activities before attempting in the real world, such as how to safely cross a heavily-congested street.[110] Likewise, virtual reality and augmented reality programs can benefit people with social attention problems – particularly children – who have difficulty reading facial expressions, understanding visual cues, or paying attention to another person while they speak. One system developed in the United States shows images from a virtual classroom with virtual people or avatars that deliver presentations. These avatars fade if the child looks

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[109] *What is 5G: A Brief Explainer*, CTIA BLOG (Feb. 1, 2018), https://www.ctia.org/news/what-is-5g-a-brief-explainer.

[110] Virtual Reality Treatment for Autism, Virtual Reality Society, https://www.vrs.org.uk/virtual-reality-healthcare/autism-treatment.html (last visited Apr. 23, 2018).

away or appears to lose interest.[111] Innovations in virtual reality and augmented reality supported by next-generation 5G networks will further help people with disabilities better interact and understand the world around them. Importantly, these faster networks can help support more e-learning by users of all communities across the country, allowing citizens to acquire additional skill sets or certifications that can enhance their employability and earning potential.[112]

Home Automation. Home automation services will also evolve as wireless networks become faster, improving the daily lives of all consumers and providing particular benefits to individuals with disabilities. Home Assistants are increasing in popularity, and currently, Apple, Google, and Amazon, among others, offer such products.[113] Home Assistants, activated by voice controls and connected to a growing variety of devices supported by IoT, are appealing to users, including those with disabilities, because they can make a variety of household tasks easier. Through voice commands, a user can power on a range of appliances, lights, and alarms, open garage doors, place grocery and other household orders, make calls, and much more, thereby independently managing daily activities for individuals who have mobility limitations and who are aging in place. With the roll-out of 5G and smart cities, these functionalities will not only improve, but they will be expanded to nearly every aspect of our daily lives both within and outside of the home.

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111 *Id.*

112 *Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities*, ACCENTURE STRATEGY, at 4 (2017), https://newsroom.accenture.com/content/1101/files/Accenture_5G-Municipalities-Become-Smart-Cities.pdf.

113 *See* HomePod, Apple, https://www.apple.com/homepod/ (last visited Apr. 23, 2018); Echo & Alexa Devices, Amazon, https://www.amazon.com/Amazon-Echo-And-Alexa-Devices/b?ie=UTF8&node=9818047011 (last visited Apr. 23, 2018); Google Home, https://store.google.com/product/google_home (last visited Apr. 23, 2018).

***Video Conferencing*.** Video conferencing applications will similarly improve with the next generation of wireless connectivity. With networks up to 100 times faster than 4G LTE, 5G will upgrade our nation's wireless networks from a virtual two-lane highway to 200 lanes. That means users will be able to stream high-definition video in seconds, in addition to powering other innovations.[114] For members of the accessibility community, this will enable high-speed and lower-latency video communications, which can be particularly beneficial for those who communicate in American Sign Language or otherwise utilize video conferencing services. Moreover, faster wireless connections can allow users to utilize video applications for telecommuting, creating a more competitive and diverse workforce that includes people with disabilities, which in turn can attract higher-paying jobs in communities across the country. Indeed, a report from Accenture Strategy found that, if localities embrace 5G, and people who are not already online become adopters, the U.S. could see an additional $90 billion in GDP and 870,000 growth in jobs.[115] Importantly, those outcomes could benefit communities of people who may have otherwise been foreclosed from the workforce, like people with disabilities.[116]

B. Low-Latency 5G Networks And Technologies Will Support A Variety Of Enhanced Capabilities In Health Care And Transportation To The Benefit Of People With Disabilities.

Another key attribute of 5G networks is that it will greatly reduce the time necessary for a wireless device to communicate with the network (latency). This means wireless

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[114] *What is 5G: A Brief Explainer*, CTIA BLOG (Feb. 1, 2018), https://www.ctia.org/news/what-is-5g-a-brief-explainer.

[115] *Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities*, ACCENTURE STRATEGY, at 4 (2017), https://newsroom.accenture.com/content/1101/files/Accenture_5G-Municipalities-Become-Smart-Cities.pdf

[116] *See* Susan Diegelman, Connected Technologies Help People with Disabilities Transcend Barriers – Is Unemployment Next?, AAPD (Mar. 19, 2018), https://www.aapd.com/connected-technologies-help-people-with-disabilities-transcend-barriers-is-unemployment-next/.

communications will be more adaptive to response times, allowing the networks to support time-sensitive applications such as remote surgery, vehicle-to-vehicle and vehicle-to-infrastructure communications, and more.[117] This connectivity will enable new and innovative use cases to benefit all consumers, but can be particularly beneficial to the accessibility community.

Health Care. 5G networks will spur further advances in health care for people with disabilities across the country. Today, wireless is helping to optimize health care outcomes, including for seniors and people with disabilities, through reliable and real-time remote access to health care professionals. Among other things, IoT has promoted preventative care and early identification and detection of illnesses, enabled doctors to treat homebound patients, and reduced the need for in-person follow-up appointments.[118] For example, Apple's CareKit software enables developers to create iOS applications that help consumers track symptoms and medication and share information with their health care providers.[119] Innovations like LG's Virtual Care platform – which allows health care providers to engage 24/7 with their patients remotely in real-time and monitor vital signs[120] – are also fostering the development of patient

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[117] *See, e.g.*, *Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities*, ACCENTURE STRATEGY, at 6 (2017), https://newsroom.accenture.com/content/1101/files/Accenture_5G-Municipalities-Become-Smart-Cities.pdf.

[118] *Wireless Connectivity Fuels Industry Growth and Innovation in Energy, Health, Public Safety, and Transportation*, DELOITTE (Jan. 2017), https://api.ctia.org/docs/default-source/default-document-library/deloitte_2017011987f8479664c467a6bc70ff0000ed09a9.pdf.

[119] ResearchKit and CareKit, Apple, https://www.apple.com/researchkit/ (last visited May 2, 2018).

[120] LG Virtual Care, LG, https://healthcare.lgcns.com/solutions/virtual-care (last visited Apr. 16, 2018). Similarly, Motorola recently partnered with Lenovo and Vital USA Inc. to develop and release the Vital Moto Mod, which is used to measure heart rate, respiratory rate, pulse oximetry, non-contact core body temperature, and accurate blood pressure. *See Vital Moto Mod Offers First Integrated Vital Signs Monitoring Platform to Accurately Measure Five Vital Signs, Including Systolic and Systolic Blood Pressure, From Your Finger*, PRNewswire (Jan. 9, 2018), https://www.prnewswire.com/news-releases/vital-moto-mod-offers-first-integrated-vital-signs-monitoring-platform-to-accurately-measure-five-5-vital-signs-including-systolic-and-diastolic-blood-pressure-from-your-finger-300579643.html. Qualcomm also has two health-related platforms connecting device manufacturers, health providers, patients and even pharmaceutical companies. *See Qualcomm Life*, https://qualcommlife.com/ (last visited

monitoring platforms. Innovative wearable technologies – traditionally used for fitness tracking – are also increasingly being used to monitor diseases.[121] Connected devices are also improving health outcomes for consumers with hearing loss. While connected hearing aids are not novel, in 2017, the ReSound company introduced the LiNX 3D, which is a hearing aid that can be adjusted remotely, enabling doctors to access their patients' hearing aids and make minor adjustments without the person having to revisit the doctor's office.[122]

With 5G, the improvements to health care outcomes will only multiply with high-speed and low-latency services and capabilities. 5G will increase the use of telemedicine, significantly changing the ways that doctors practice medicine and interact with their patients.[123] And,

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Apr. 17, 2018); *Qualcomm Life, 2net™ Platform*, https://qualcommlife.com/2net-platform (last visited Apr. 17, 2018). And Samsung's Samsung Health app, released last year, provides users with the ability to video chat with health care providers. *Samsung Health*, https://www.samsung.com/us/samsung-health/ (last visited Apr. 17, 2018). The app also tracks activity levels, nutrition, and sleep patterns. *Id.*

[121] The Kardia Band, for instance, is a Food and Drug Administration-cleared device designed to be used with the Apple Watch to monitor heart rhythms by placing the user's thumb on the band's sensor to take a medical-grade EKG in thirty seconds. *See KardiaBand*, AliveCor, https://www.alivecor.com/#kardiaband (last visited Apr. 16, 2018). Electronics manufacturer Kyocera recently announced that it was developing an algorithm for a sensor capable of detecting dehydration, heat stroke, or altitude sickness that can be incorporated in wearable devices or smartphones. *See Visualize Health Conditions Easily as a Daily Routine: Development of Compact Blood Flow Sensor using Optical Doppler Effect*, https://global.kyocera.com/ecology/feature/feature01.html (last visited Apr. 16, 2018). And Nokia offers a portable blood pressure cuff; data from the cuff is automatically launched and provided in Nokia's Health Mate app, which can be uploaded via email to a user's health care provider. *See Nokia BPM*, https://health.nokia.com/us/en/blood-pressure-monitor (last visited Apr. 17, 2018).

[122] Ashley Carmen, *These iPhone-Connected Hearing Aids Let Doctors Make Adjustments Remotely*, VERGE (Apr. 3, 2017), https://www.theverge.com/circuitbreaker/2017/4/3/15166662/resound-linx-3d-connected-hearing-aid-iphone. The aid pairs with iOS, Apple Watch, and Android, and allows patients to speak with their doctors regarding their hearing aids through the app.

[123] Jilane Petrie, *This Week in 5G: All Things Video*, CTIA BLOG (Apr. 2, 2018), http://www.ctia.org/news/this-week-in-5g-all-things-video (discussing how 5G will bring the capabilities of medical specialists to patients who may be thousands of miles away).

innovative 5G services and devices in the health care industry will facilitate increased access to patients and remote monitoring, as well as advance health care research.[124]

For example, wireless 5G connectivity will give patients in rural areas remote access to telehealth and telemedicine by connecting them with specialists and experienced professionals across the country.[125] This reduces the need to transfer sick patients, not only lowering costs, but improving the quality of care.[126] For those suffering from chronic illnesses like diabetes, cardiovascular disease, or cancer, remote monitoring is essential. Devices like clinical wearables and remote sensors will track vital signs, glucose levels, and physical activity, and transmit that data to the patient's health care provider.[127]

The low latency of 5G networks is also expected to support remote surgery applications, enabling surgeons to operate on patients across the country, facilitating access to specialists who may not otherwise be available. 5G connectivity will further empower patient choice, encourage patients to see a health care professional sooner, and provide new functionality for the health care industry. As a result, 5G could create more than $300 billion in annual health savings, especially for people with disabilities.[128]

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[124] As CTIA recently noted, medical researchers use wireless technologies to advance patient monitoring by using wearables and movement sensors. *See* Comments of CTIA, WT Docket No. 17-79 et al. (filed June 15, 2017) (citing Intel, *Using Wearable Technology to Advance Parkinson's Research* (2015), http://www.intel.com/content/dam/www/public/us/en/documents/white-papers/using-wearabletechnology-mjff.pdf).

[125] *Wireless Connectivity Fuels Industry Growth and Innovation in Energy, Health, Public Safety, and Transportation*, DELOITTE (Jan. 2017), https://api.ctia.org/docs/default-source/default-document-library/deloitte_2017011987f8479664c467a6bc70ff0000ed09a9.pdf.

[126] *Id.*

[127] *Id.*

[128] *Id.*; *see also* Jilane Petrie, *This Week in 5G: All Things Video*, CTIA BLOG (Apr. 2, 2018), http://www.ctia.org/news/this-week-in-5g-all-things-video.

Transportation. The low latency of 5G networks will also create new opportunities in personal transportation for people with disabilities. 5G support for time-sensitive vehicular communications can facilitate the development and deployment of autonomous vehicles by enabling vehicle-to-vehicle communications.[129] Autonomous vehicles will reduce transportation obstacles for people with disabilities and establish new norms of personal and professional independence for people with mobility limitations to have a reliable method of transportation to obtain full-time employment. Indeed, a study by the Ruderman Family Foundation estimates self-driving cars could open two million employment opportunities for people with disabilities.[130] In addition, nearly $20 billion could be saved each year by reducing the millions of missed medical appointments because of transportation barriers alone.[131]

5G can also revolutionize mass transportation options for people with disabilities. Independent car manufacturer Local Motors, in coordination with IBM, is developing assistive technologies to add to autonomous busses that combine augmented reality, artificial intelligence, and smartphone applications to better serve people with disabilities.[132] The companies are currently testing technologies, but hope to add an array of accessible capabilities that will direct visually-impaired passengers to available seats; employ augmented reality to read and speak sign

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129 *What is 5G: A Brief Explainer*, CTIA BLOG (Feb. 1, 2018), https://www.ctia.org/news/what-is-5g-a-brief-explainer.

130 HENRY CLAYPOOL, AMITAI BIN-NUN, PH.D., JEFFREY GERLACH, THE RUDERMAN WHITE PAPER SELF-DRIVING CARS: THE IMPACT ON PEOPLE WITH DISABILITIES 16 (Jan. 2017), http://secureenergy.org/wp-content/uploads/2017/01/Self-Driving-Cars-The-Impact-on-People-with-Disabilities_FINAL.pdf.

131 *Id.*

132 Elizabeth Woyke, *Self Driving Bus That can Speak Sign Language*, MIT TECH. REV. (Apr. 13, 2017), https://www.technologyreview.com/s/604116/a-self-driving-bus-that-can-speak-sign-language/.

language; and recognize passengers waiting at bus stops who have walkers or wheelchairs to activate an accessible ramp and deploy equipment to help them secure their assistive devices.[133]

Finally, the low latency of 5G will also enhance transportation safety. Qualcomm and ZTE recently announced a partnership commercialization of cellular vehicle-to-everything (C-V2X) communications technologies using Qualcomm's 9150 C-V2X chipset solution, which promise to improve driving safety and traffic efficiency associated with autonomous driving.[134] And General Motors is working on a driverless car fleet equipped with OnStar crash-response that will automatically alert an OnStar representative and predict the severity of injuries in the event of a collision.[135]

C. The Network Densification Needed To Support 5G Will Improve Geo-Location And Navigation Services For People Who Are Blind, Low-Vision, Or Mobility-Limited.

The next generation of wireless connectivity will support five times as many devices as 4G LTE networks today. That connectivity will require more densified networks with smaller wireless antennas placed discretely in the rights-of-way and inside buildings. With this densification, networks will be more targeted in ways that can enhance geo-location and navigation services, both outdoors and in buildings. This will be particularly beneficial to blind and low-vision users, and will help foster independence for accessibility community and seniors aging in place.

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133 *Id.*

134 Linda Trego, *ZTE Launching C-V2X Module*, AUTONOMOUS VEHICLE TECH (Feb. 28, 2018), https://www.autonomousvehicletech.com/articles/707-zte-launching-c-v2x-module.

135 *See* Nora Naughton, *GM Moves to Deploy Driverless Car Fleet in 2019*, THE DETROIT NEWS (Jan. 12, 2018), https://www.detroitnews.com/story/business/autos/general-motors/2018/01/12/gm-driverless-car-fleet-cruise-av/109381232/.

Today, applications and devices already take advantage of 4G LTE and wireless infrastructure to facilitate location and navigation services for the accessibility community. For example, AccessMap – an online travel planner project designed specifically for people who need accessible or pedestrian-friendly routes – is providing people with disabilities with better navigation assistance to navigate Seattle, Washington.[136] Google added a similar feature in 2017 to its Maps app that allows users to add accessibility details for various locations,[137] and cities such as Boston and Austin are utilizing Bluetooth and other technologies to help people who are blind or visually impaired navigate their way to bus stops and train stations.[138]

With 5G networks, location and navigation capabilities will be greatly enhanced, to the benefit of all consumers but particularly for people who are blind or low vision. The accuracy of commercial location services is directly related to proximity to wireless infrastructure and access points. Highly densified 5G networks will support real-time, location-based information, which can be relayed directly to users. This capability will afford greater precision in location accuracy for those who need assistance navigating buildings and communities. It will also protect the public health by providing real-time location-based data to detect changes and trends in the

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136 Jennifer Langston-Washington, *AccessMaps Lets You Avoid Hills, Curbs, Construction*, Futurity (Feb. 3, 2017), https://www.futurity.org/pedestrians-sidewalks-directions-1351142-2/. The developers of AccessMap plan to expand to other areas, including New York, Washington, D.C., Boston, Chicago, San Francisco, Portland, Pittsburgh, Denver, Philadelphia, and Atlanta. *Id*.

137 Brian Heater, *Google Maps Now Lets Users Add Wheelchair Accessibility Details for Locations*, TECH CRUNCH (July 8, 2017), https://techcrunch.com/2017/07/08/google-maps-now-lets-users-add-wheelchair-accessibility-details-for-locations/.

138 Skip Descant, *Technology Guides Blind Transit Riders Right to the Bus Door*, GOVTECH.COM (Apr. 13, 2018), http://www.govtech.com/Technology-Guides-Blind-Transit-Riders-Right-to-the-Bus-Door.html (explaining that "Bluetooth technology, crowdsourcing, and connected devices are making mobility easier for blind, visually impaired or disabled transit riders. In Boston, transit officials, through a partnership with Perkins School for the Blind, have been contributing data to the app BlindWays, which combines GPS data with special clues to get users to the exact location of a bus stop").

environment over time[139] and improve 9-1-1, emergency alerting, and public safety outcomes for the community at large.[140] The wireless industry continues to innovate and develop technologies that enhance the public safety mission, and the next generation of highly densified 5G networks and technologies will further enhance the safety of people with disabilities.

III. THE WIRELESS INDUSTRY CONTINUES TO ENGAGE WITH AND INFORM THE ACCESSIBILITY COMMUNITY ABOUT WIRELESS PRODUCTS AND SERVICES.

The wireless industry continues to consult and collaborate with the accessibility community to ensure that products and services are accessible to and usable by consumers with a variety of needs. Developments since 2016 demonstrate that wireless providers and manufacturers remain committed to engaging in a multitude of outreach initiatives and events to continue the dialogue between the wireless industry and the accessibility community so that the wireless industry can continue meeting the needs of people with disabilities.

A. The Wireless Industry Collaborates With The Accessibility Community Through Outreach Initiatives And Participation In Accessibility Events.

The wireless industry has been active in hosting accessibility workshops, seminars, and community outreach initiatives aimed at including and increasing accessibility for people with

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139 *Wireless Connectivity Fuels Industry Growth and Innovation in Energy, Health, Public Safety, and Transportation*, DELOITTE (Jan. 2017), https://api.ctia.org/docs/default-source/default-document-library/deloitte_2017011987f8479664c467a6bc70ff0000ed09a9.pdf (discussing how sensors can be deployed to monitor air quality and other conditions to identify potential pest infestations, detect urban flooding, and track variables related to asthma attached, to name a few).

140 *See, e.g.*, *The Global Race to 5G*, CTIA (Apr. 2018), https://api.ctia.org/wp-content/uploads/2018/04/Race-to-5G-Report.pdf; *Smart Cities: How 5G Can Help Municipalities Become Vibrant Smart Cities*, ACCENTURE STRATEGY, at 10 (2017), https://newsroom.accenture.com/content/1101/files/Accenture_5G-Municipalities-Become-Smart-Cities.pdf (noting that wireless connectivity can support real-time monitoring of gunshots, providing police and first responders with exact location, thereby speeding response times); *Wireless Connectivity Fuels Industry Growth and Innovation in Energy, Health, Public Safety, and Transportation*, DELOITTE (Jan. 2017), https://api.ctia.org/docs/default-source/default-document-library/deloitte_2017011987f8479664c467a6bc70ff0000ed09a9.pdf.

disabilities. For example, Apple hosts in-school coding sessions for students as part of its Everyone Can Code curriculum, which is designed to be accessible to all students, including those with vision or other disabilities.[141] Samsung has created Samsung Supporters, consisting of volunteers who test smartphone features for accessible usability and provide feedback to improve the user experience for people with disabilities.[142] Sony continues to host Accessibility Awareness Day held at different Sony locations in the United States each year, to which guest speakers are invited to promote accessibility awareness. Sony also released a voice reader-compatible "Notice of the Ordinary General Meeting of Shareholders" on the Shareholders' meeting section of its website so that individuals with visual impairment could read the information.[143]

Service providers likewise have continued their engagement with the accessibility community. AT&T has been active through a number of collaborations aimed at introducing emerging technology to seniors and people with disabilities. In June 2017, AT&T hosted the AT&T Advisory Panel on Access and Aging, which focused on how RTT, IoT, smart cities, and disability marketing affect the aging population.[144] AT&T also actively supports the AARP TEK (Technology, Education and Knowledge) Program, a free, live, hands-on workshop that

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[141] Lori Hawkins, *With An Assist from Apple, Visually Impaired Austin Students Learn To Write Code, Fly Drones*, 512TECH BY THE AUSTIN AMERICAN-STATESMAN (Mar. 7, 2018) https://www.512tech.com/technology/with-assist-from-apple-visually-impaired-austin-students-learn-write-code-fly-drones/KbOaJnSwOoH2MHgTFNFAmL/?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axioslogin&stream=top-stories.

[142] *Creating Accessible Technology for All to Easily Utilize*, SAMSUNG (Apr. 20, 2018), https://news.samsung.com/global/creating-accessible-technology-for-all-to-easily-utilize.

[143] *Accessibility efforts: Initiatives and accolades*, SONY, https://www.sony.net/SonyInfo/accessibility/challenges_awards/ (last visited May 2, 2018).

[144] AT&T Advisory Panel on Access and Aging, AT&T, https://www.aapaalive.com/ (last visited May 2, 2018).

helps close the technology gap among people ages 50 and over.[145] AT&T collaborated with Aira to develop and test a new AI-powered prescription medicine reader,[146] and to provide human-assisted AI to give blind and visually impaired customers information about their surroundings.[147] The two companies partnered with the National Federation for the Blind to give 100 blind college freshman AI-powered smart glasses that would help them see their surroundings and better interact with their environment.[148] This was made possible through the AT&T Foundry for Connected Health, which facilitates research and development in the digital health space.[149]

TracFone likewise established consultative relationships with a number of disability organizations to get feedback on the accessibility of its website and mobile applications, and conducts user tests to acquire ongoing feedback on the accessibility of its brand pages using mobile Internet browsers. TracFone also regularly solicits recommendations for improving access to its services and has made numerous changes based on interactions with and feedback

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[145] Accessibility, AT&T, http://about.att.com/content/csr/home/issue-brief-builder/people/accessibility.html (last visited May 2, 2018).

[146] *AT&T Collaborates With Aira to Develop New AI Powered Prescription Medication Reader*, AT&T (Mar. 6, 2018), http://about.att.com/story/aira_new_ai_powered_perscription_medication_reader.html.

[147] *AT&T to Provide Wireless Connectivity for Aira's Devices that Enhance Access to Information for Blind and Visually Impaired People*, AT&T (Jan. 4, 2017), http://about.att.com/story/aira_to_use_att_wireless_connectivity.html.

[148] *AT&T, Aira and the National Federation of the Blind Launch Innovative "Back-To-School" Program for Blind College Freshmen*, AT&T (Sept. 28, 2017), http://about.att.com/story/back_to_school_program.html.

[149] Ken Yeung, *AT&T brings wireless connectivity to Aira wearables for the blind*, VENTUREBEAT, (Jan. 4, 2017), https://venturebeat.com/2017/01/04/att-brings-wireless-connectivity-to-aira-wearables-for-the-blind/.

from people with disabilities, as well as on internal audit processes of both software and quality testing.

Additionally, T-Mobile also participates in the Hearing Loss Association of America's annual conferences, as well as the M-Enabling annual summits. These, as well as its other outreach initiatives, enable continued collaboration between the company and consumer stakeholders on accessibility matters.

For its part, Verizon hosted the DeafBlind Citizens in Action at its Technology and Policy Center in Washington, D.C. to discuss how 5G will create new and exciting opportunities for accessibility.[150] Verizon has also conducted training sessions to teach seniors how to use their smartphones to communicate, while protecting themselves from becoming victims of online scams.[151] Such trainings fill a crucial need as the percentage of citizens aged 65 and older who have a smartphone but no home Internet connectivity has more than doubled in the last two years.[152] Verizon's Innovative Learning Program also provides every student in select middle schools nationwide a tablet and two-year data plan, which is particularly beneficial to children with disabilities who can utilize a range of accessible features and services on the devices.[153] Verizon also held a private RTT demonstration for representatives of consumers who are deaf or

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150 Zack Bastian, *How 5G and IoT technology will improve accessibility*, VERIZON (Oct. 3, 2017), http://www.verizon.com/about/news/how-5g-and-iot-technology-will-improve-accessibility.

151 Libby Jacobson Fox, *Mobile-first technology is bringing our seniors the promise of the digital world*, VERIZON (Oct. 7, 2016), http://www.verizon.com/about/news/mobile-first-technology-bringing-our-seniors-promise-digital-world.

152 Libby Jacobson Fox, *Mobile-first technology is bringing our seniors the promise of the digital world*, VERIZON (Oct. 7, 2016), http://www.verizon.com/about/news/mobile-first-technology-bringing-our-seniors-promise-digital-world.

153 Become a Verizon Innovative Learning School, Verizon, http://www.verizon.com/about/responsibility/become-verizon-innovative-learning-school (last visited May 2, 2018).

hard of hearing, covering Verizon's RTT interface on Apple and Android devices. Attendees provided valuable input on the form and function of the interface, and Verizon will continue to solicit feedback.

Moreover, Sprint's accessibility team sought input from the accessibility community about the types of features that were needed. This conversation led to partnerships with Humanware, a Braille device manufacturer, to ensure Sprint devices were accessible,[154] and the National Federation of the Blind, to offer a free app that converts printed text into speech or Braille to assist customers who are blind or have low vision.[155] Input from the accessibility community also resulted in Sprint working with CapTel to release a new telephone that is compatible with select Braille readers.[156] Sprint also hosted a DeafBlind Town Hall in several cities across the country.[157]

Finally, in addition to the numerous efforts of its members, CTIA has attended, sponsored, or hosted more than 50 events in collaboration with the accessibility community since 2016 that promote accessibility. For example, each year CTIA hosts an Accessibility Outreach Initiative Forum that allows members of the wireless industry as well as representatives from leading accessibility organizations to participate in in-depth, roundtable discussions on the state of wireless accessibility. CTIA also sponsors and hosts an annual workshop at the Hearing Loss

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[154] The app enables a DeafBlind user to self-identify as a Braille user and to turn on the functionality that allows them to receive Braille on their Braille display.

[155] Press Release, Sprint Accessibility Offers Free App to Customers Who are Blind or Have Low Vision (Nov. 15, 2017), http://newsroom.sprint.com/sprint-accessibility-offers-free-app-to-customers-who-are-blind-or-have-low-vision.htm.

[156] Blind –Low Vision Users, SprintCapTel, https://sprintcaptel.com/solutions-by-sprint/blv/ (last visited May 2, 2018).

[157] *See, e.g.*, *Sprint Accessibility Town Hall Meeting* (May 13, 2017), https://www.dbctx.org/wp-content/uploads/2017/04/Sprint-IP-Town-Hall-Flyer-Austin-May-13.pdf (providing information for a town hall meeting held in Austin, Texas).

Association of America's Annual Convention. The workshop educates consumers on HAC and the latest in wireless accessibility. CTIA kicked off 2018 by hosting an AAPD (American Association of People with Disabilities) Tech Forum meeting where participants discussed what 5G will mean for accessibility, and we fully expect that efforts like these – from CTIA and our members – will continue.

B. The Wireless Industry Continues To Provide Increased Consumer Resources To The Accessibility Community.

As the number of products and services beneficial to the accessibility community has increased, so too have the resources enabling people to easily find, access, and take full advantage of them. CTIA's accessibility website, AccessWireless.org, continues to be a useful "first stop" for people with disabilities, seniors, and their families and caregivers to obtain information about accessible wireless products and services. AccessWireless.org features different sections of the website tailored to people with hearing, vision, mobility and manipulation, speech, and cognitive impairments.[158] Since 2016, CTIA has refreshed the website's branding, added a section to the "Hearing" page with consumer tips and resources on RTT, and upgraded the website's most frequently used pages. In particular, the most frequently used tool is the "Find a Phone" feature, which is powered by the Global Accessibility Reporting Initiative (GARI), to assist people with disabilities in locating a device suitable to their unique needs.[159] The GARI tool houses information on accessibility features that are built into more than 1,330 devices, including mobile phones, tablets, Smart TVs, and wearables, as well as accessibility information on more than 340 mobile applications, as of 2016.[160] In the last two

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158 AccessWireless Home, http://accesswireless.org/Home.aspx (last visited May 2, 2018).

159 GARI, AccessWireless, http://accesswireless.org/Find/Gari.aspx (last visited May 2, 2018).

160 GARI, Annual Report 2016 (Mobile & Wireless Forum 2016) http://www.mwfai.org/docs/eng/GARI_2016_AnnualReport_accessible.pdf (rel. May 2017).

years, CTIA has upgraded this page with software updates that make it easier for users to navigate the GARI search tool without leaving AccessWireless.org.

Many service providers and manufacturers also offers accessible manuals, guides, specialized online stores, and other resources to help consumers find accessible services, devices, and applications. For example, T-Mobile makes available to qualifying customers who have a disability a directory assistance credit and offers customers alternative billing formats upon request.[161] AT&T offers Braille U-verse billing,[162] while Verizon likewise offers alternate billing formats.[163] Sprint offers Directory Assistance calls on a complimentary basis to people who are blind or visually impaired, as well as monthly invoices in Braille, large print, or electronic format.[164] Similarly, TracFone has created an email address for accessibility and dedicated a 1-800 number for feedback on its websites for hearing, visual, and speech accommodations. It also trains its customer support staff on how to handle calls with people with accessibility needs, and these interactions are recorded and reviewed for quality control.[165] TracFone is also creating accessibility pages for all of its brands, which will be completed in June 2018; the link to the company's accessibility page will be located on the homepage of each brand website. The Sprint Relay Store also provides a one-stop resource for Sprint customers on

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[161] T-Mobile Accessibility, T-Mobile, https://www.t-mobile.com/customers/accessibility-policy (last visited Apr. 30, 2018).

[162] AT&T Accessibility, AT&T, https://www.att.com/features/accessibility.html (last visited May 2, 2018).

[163] Visual Assistance, Verizon, http://www.verizon.com/about/accessibility/visual-assistance#unlimited-plans (last visited May 2, 2018).

[164] Mobility Disability, Sprint, https://www.sprint.com/en/shop/services/accessibility/wireless.html#mobility-disability (last visited May 2, 2018).

[165] Accessibility, TracFone, https://www.tracfone.com/accessibility?=&projectid=3eb3c5fe-5bb7-41df-b76a-9d9fabafb50f (last visited May 2, 2018).

accessible devices, tailored service plans, relay services, and more.[166] Sprint authored a PDF accessibility specification in 2017 and requires its device manufacturers to comply with it to produce Accessible user guides for all devices.

Wireless manufacturers are likewise developing resources for consumers to better understand the accessible features of their devices. Apple, Samsung, HTC, and LG, for example, each have dedicated websites explaining in text, pictures, and video the various functionalities available on their devices, including break-outs for functionalities that can meet the needs of specific user communities.[167] Kyocera also provides alternate formats for user guides, such as Braille and ASCII text formats, for its devices,[168] and Sony provides HAC information, additional details on sensory assist features, and links to the GARI database for consumers to easily find devices that will fit their needs.[169] Amazon likewise offers information on its website about accessibility features of its webpage and products.[170]

Service providers have also taken steps to ensure their websites have information consumers need about accessible products and services. AT&T, for example, recently revamped

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166 Sprint Relay Store, Sprint, https://sprintrelaystore.com/index.php (last visited Apr. 30, 2018).

167 Accessibility, Apple, https://www.apple.com/accessibility/ (last visited Apr. 27, 2018); Mobile Accessibility, Samsung, http://www.samsung.com/latin_en/mobileaccessibility/ (last visited Apr. 27, 2018); Accessibility, HTC, https://www.htc.com/us/Accessibility/ (last visited Apr. 27, 2018); LG Android Phone Accessibility Features, LG, http://www.lg.com/us/accessibility/mobile/how (last visited Apr. 27, 2018).

168 Accessibility Solutions, Kyocera, https://www.kyoceramobile.com/accessibility/ (last visited May 2, 2018).

169 Hearing Aid Compatibility, Sony, https://blogs.sonymobile.com/about-us/sustainability/accessibility/hearing-aid-compatibility/#gref (last visited May 2, 2018); Sony & Accessibility, Sony, https://www.sony.net/SonyInfo/accessibility/index.html (last visited Apr. 27, 2018).

170 Amazon Accessibility, Amazon, https://www.amazon.com/b?ie=UTF8&node=15701038011 (last visited Apr. 27, 2018).

its accessibility webpage[171] adding resources and billing information tailored to a variety of needs. Verizon likewise redesigned and relaunched its accessibility portal by adding seasonal information about partnerships and awareness months, as well as content from stakeholder engagements.[172] Verizon also implemented updates and a brand refresh to its app, which meets color contrast requirements, marks hyperlinks, ensures that field labels and errors are recognized by screen readers, and locks font sizes and icons on the screen. And T-Mobile's recent Accessibility webpage redesign is intended to provide an even more enjoyable online shopping experience for consumers interested in its accessible products and service offerings, while also serving as a useful resource of information for consumers.

Service providers also offer services and information for seniors. For example, U.S. Cellular offers a phone accessibility guide and data usage estimator aimed at the unique needs of older adults, including tips to familiarize seniors with basic accessibility settings and features on their devices.[173] Additionally, providers like AT&T, T-Mobile, and Verizon list devices and service plans that may appeal to seniors, while Sprint lists third-party applications on its website that may be beneficial to the community. Consumer Cellular also highlights phones with an easily accessible emergency call button for seniors,[174] and Cricket Wireless offers service plan

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171 AT&T Accessibility, AT&T, https://www.att.com/features/accessibility.html (last visited May 2, 2018).

172 Welcome to you Accessibility Resource Center, Verizon, http://www.verizon.com/about/accessibility/overview (last visited May 2, 2018).

173 Smartphones for Seniors: Choosing the Right Phone and Plan, U.S. Cellular, http://connected.uscellular.com/live-home-and-family/smartphones-seniors-choosing-right-phone-plan/ (last visited May 2, 2018).

174 Buying Guide, Consumer Cellular, https://www.consumercellular.com/Products/BuyingGuide (last visited May 2, 2018).

discounts for AARP members. Notably, Carolina West Wireless partnered with iSelectMD to give its customers access to board certified physicians over the phone 24/7.[175]

Finally, there are also a variety of consumer-facing resources that train and empower people with disabilities. The Chrome YouTube series provides details on how to navigate Google Chrome using keyboard commands[176] and Microsoft's Internet Explorer provides a list of accessible features on its web browser.[177] Amazon also lets users know that the mobile version of its website is optimized for screen readers.[178] Microsoft also launched an accessibility-focused blog, newsroom, and Twitter account to provide consumers with information. The company also has downloadable guides for vision, hearing, speech, mobility, and learning disabilities. Similarly, GARI has a searchable database that has hundreds of applications for individuals with dexterity, hearing/speech, cognition and vision related disabilities.[179]

C. The Wireless Industry Has Been Recognized For Its Efforts In Ensuring That Wireless Products and Services Are Accessible.

The wireless industry has been recognized for its efforts to provide accessible products and services to consumers. CTIA, for example, has won multiple awards, including the James C.

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[175] Mobile Health, Carolina West, https://www.carolinawest.com/mobilehealth (last visited May 2, 2018).

[176] *Chrome & Chrome OS Accessibility*, YouTube, https://www.youtube.com/playlist?list=PL5aqr5w5fRe7QWzXhqxrilIVduWEmLHM2 (last visited May 2, 2018).

[177] *Windows Accessibility*, Microsoft, https://www.microsoft.com/en-us/accessibility/windows (last visited May 2, 2018).

[178] Amazon Accessibility, Amazon, https://www.amazon.com/b?ie=UTF8&node=15701038011 (last visited Apr. 27, 2018).

[179] *Find Accessible Devices and Apps*, GARI, https://www.gari.info/findapps-results.cfm (last visited May 2, 2018).

Marsters Promotion Award from Telecommunications for the Deaf and Hard of Hearing, for illustrating CTIA's commitment to promoting accessible communications products and services through AccessWireless.org, work on the GARI database, and accessible emergency communication efforts such as RTT and text-to-9-1-1.[180] Additionally, Sony won the 2016 HLAA Innovation Award for developing Entertainment Access Glasses, which project holographic captions onto glasses so hearing-impaired individuals have the opportunity to attend and enjoy movie theaters.[181] T-Mobile, Verizon, Sprint, and AT&T were each recognized by AAPD and the U.S. Business Leadership Network with scores of 100 in the Disability Equality Index, a rigorous benchmark of inclusion practices administered by the organizations.[182] And the Commission honored several companies in 2017 at the sixth annual Chairman's Awards for Advancement in Accessibility for their work in making wireless products more accessible, including Ava for its app designed for people who are deaf or hearing impaired; Amazon for VoiceView, which reads on-screen texts; and Aira for its app that connects blind users to sighted agents.[183] Regardless of accolades, however, the wireless industry remains committed to continuing its efforts to bring products and services to the marketplace that are accessible to and usable by consumers of varying needs.

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[180] Press Release, Recognizing Individuals and Organizations for Advocacy, Innovation, and Service, TDI (June 6, 2017), https://tdiforaccess.org/2017/07/awards-luncheon/.

[181] Press Release, HLAA Announces 2016 Award Recipients, HLAA (May 24, 2016), http://www.hearingloss.org/content/hlaa-announces-2016-award-recipients.

[182] 2017 Disability Equality Index Results Best Places to Work, https://www.disabilityequalityindex.org/top_companies (last visited Apr. 27, 2018).

[183] Press Release, FCC Chairman Pai Honors Innovators in Accessibility Communications Technology (June 13, 2017), https://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0613/DOC-345332A1.pdf.

IV. THE COMMISSION CAN SUPPORT FURTHER INNOVATION IN ACCESSIBLE WIRELESS PRODUCTS AND SERVICES THROUGH TARGETED REGULATORY ACTIONS.

In order to facilitate the development and deployment of innovative wireless services and products that benefit all Americans, including those with disabilities, the Commission must ensure that wireless networks and technologies can be rapidly and efficiently deployed. Allocating more spectrum suitable for wireless use and modernizing infrastructure siting rules are essential to ensuring this growth. Additionally, CTIA urges the Commission to continue its efforts to refine the RDA process in ways that ensure consistent outcomes for industry and consumers.

A. The Wireless Industry Needs Access To More Spectrum Suitable For Wireless Use.

To support the increasing capacity needs of 4G LTE networks and deploy 5G-enabled networks and equipment, the wireless industry will need access to sufficient spectrum resources. CTIA applauds the Commission's efforts to date to ensure that low-, mid-, and high-band spectrum is available for wireless use. Indeed, the Commission has appropriately stated that it is a priority for the United States to remain the global leader in wireless technology.[184] When the United States won the race to 4G, it boosted America's gross domestic product by nearly $100 billion and the wireless industry saw an 84 percent increase in wireless-related jobs from 2011 to 2014.[185] Consumers saw a dramatic increase in the value they received from wireless services,

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[184] *See* Remarks of FCC Chairman Ajit Pai At The Mobile World Congress (Feb. 26, 2018), https://apps.fcc.gov/edocs_public/attachmatch/DOC-349432A1.pdf (stating that "despite tremendous American success in 4G, we aspire to lead the world in 5G").

[185] *See* Letter from Scott K. Bergmann, Senior Vice President, Regulatory Affairs, CTIA to Marlene H. Dortch, Secretary, FCC, GN Docket No. 14-177 *et al*. (April 17, 2018); Recon Analytics, *How America's 4G Leadership Propelled the U.S. Economy* (April 16, 2018), https://api.ctia.org/wp-content/uploads/2018/04/Recon-Analytics_How-Americas-4G-Leadership-Propelled-US-Economy_2018.pdf.

as the cost per megabyte fell by 99.7 percent from the 3G era through 2016.[186] As the 4G leader, the United States also was able to secure other leading positions in key components of the global wireless ecosystem, such as the app economy. These critical economic benefits could have gone to other countries, which would have had a substantial negative effect on the U.S. economy.[187] Because wireless networks "are the foundational nexus"[188] of an entire ecosphere of manufacturers and service providers, the loss of generational wireless leadership would manifest across the ecosystem and have lasting effects including job losses and market share declines.[189]

Next-generation wireless services and networks are estimated to generate $500 billion in economic growth and create millions of new jobs.[190] It is critical that the U.S. use the momentum from being the world's 4G leader to win the global race in 5G. Currently, China holds a narrow lead in overall 5G-readiness ahead of South Korea and the United States.[191]

In order to lead the race to 5G, the U.S. needs to implement government policies that facilitate 5G leadership and, in particular, allocate the mid-band spectrum that the wireless industry needs to win the race. By the end of 2018, the U.S. is projected to rank sixth in mid-

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186 Recon Analytics, *supra* note 185.

187 Losing wireless 4G leadership contributed to job losses and other long-term negative effects in Japan and in Europe. *See China Holds Narrow Lead in Global Race to 5G, Report Finds*, CTIA BLOG (Apr. 16, 2018), http://www.ctia.org/news/china-holds-narrow-lead-in-global-race-to-5g-report-finds.

188 Recon Analytics, *supra* note 185.

189 *The Global Race to 5G*, CTIA (Apr. 2018), https://api.ctia.org/wp-content/uploads/2018/04/Race-to-5G-Report.pdf (explaining that "Europe saw tangible economic benefits from having the most advanced 2G networks, leading the world in networking equipment, operating systems and handsets. That leadership translated into hundreds of thousands of jobs and billions in economic impact. Losing this leadership resulted in massive job losses and a dramatic contraction of the region's telecom hardware and software industries").

190 Letter from Scott K. Bergmann, Senior Vice President, Regulatory Affairs, CTIA, to Marlene H. Dortch, Secretary, FCC, AU Docket No. 18-85 *et al.* (filed Apr. 11, 2018).

191 *See China Holds Narrow Lead in Global Race to 5G, Report Finds*, CTIA BLOG (Apr. 16, 2018), http://www.ctia.org/news/china-holds-narrow-lead-in-global-race-to-5g-report-finds.

band spectrum availability, and the U.S. is one of the few countries that has *not* committed to allocating mid-band spectrum on an exclusive basis for terrestrial mobile use by the end of 2020.[192]

CTIA commends the Commission for its recent efforts to identify high-band spectrum for 5G,[193] and for scheduling the first high-band spectrum auctions starting in November.[194] However, it is critical that the Commission identify and auction additional bands suitable for wireless 5G use. In particular, the Commission should act quickly to make mid-band spectrum available for licensed wireless use, and identify additional high-band spectrum for licensed terrestrial wireless access, so that the wireless industry can continue to invest and bring innovative services and equipment to market that benefit all consumers, especially people with disabilities.

B. The Commission Should Modernize Its Infrastructure Siting Policies To Ensure That Wireless Networks Can Be Rapidly And Efficiently Deployed.

The wireless industry cannot speedily deploy wireless infrastructure to expand service to bolster existing 4G LTE networks, deploy in unserved or underserved areas, and support 5G when a variety of federal, state, and local regulatory barriers make such deployment cost- or time-prohibitive. For the networks to expand rapidly, particularly to deploy the small cells

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192 *Id.*

193 *See, e.g.*, *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd. 10988 (2017); *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd. 8014 (2016).

194 *Competitive Bidding Procedures for Auction 101(28 GHz) and Auction 102 (24 GHz)*, Public Notice, FCC 18-43, AU Docket No. 18-85 (rel. Apr. 17, 2018).

needed to densify existing networks and support 5G, regulatory policies must be modernized to reflect the infrastructure deployments they oversee.[195]

The rules that govern wireless deployments today were predominantly developed when 200-foot towers were the norm. Our new wireless networks, however, will rely on much denser infrastructure that utilize back-pack sized antennas. Indeed, with an estimated 300,000 small cell deployments expected in the next three to four years to bring advanced wireless communications to cities and towns across the country, regulatory policies must be established to shift the business case and enable deployment. Even more, the densified wireless infrastructure that is needed to support the high speeds, low latency, and improved geo-location solutions of IoT and 5G cannot be harnessed to meet the needs of people with disabilities without the Commission, as well as state and local governments, right-sizing their infrastructure policies.

For these reasons, CTIA appreciates the Commission's recent efforts to modernize its infrastructure siting processes[196] and encourages the Commission to continue making progress on additional infrastructure reforms, which are necessary to expedite deployment and enable 5G and IoT technologies. In particular, the Commission should work to provide guardrails around the state and local siting review processes, including by ensuring non-discriminatory access to public rights-of-way and publicly owned assets, confirm that fees must be cost-based and non-discriminatory, and establish shot clocks with enforceable deemed granted remedies for the entire review process. By taking these steps, the Commission will better ensure that its

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195 *The Global Race to 5G*, CTIA (Apr. 2018), https://api.ctia.org/wp-content/uploads/2018/04/Race-to-5G-Report.pdf.

196 *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment*, Second Report and Order, FCC 18-30, WT Docket No. 17-79 (rel. Mar. 30, 2018).

infrastructure policies reflect the scale and scope of next-generation infrastructure, and facilitate the deployment of networks and technologies that can benefit all consumers.

C. The Commission Should Continue To Refine Its RDA Process To Ensure Consistent Outcomes For Industry And Consumers.

In CTIA's members' experience, the RDA process has become increasingly more consistent as it has matured, and has proven to be an effective mechanism for facilitating dispute resolution between consumers and industry stakeholders. There is, however, opportunity for the Commission to continue exploring enhancements that will make the process even more effective.

Since the last report to Congress, Commission staff has administered RDAs more consistently and, as a result, consumers and covered entities have better expectations regarding potential outcomes. This more consistent process has fostered greater collaboration between the wireless industry, consumers, and the accessibility community, which in turn has better addressed consumers' needs. However, RDA process issues remain, particularly with respect to the process for formally closing RDAs. CTIA encourages the Commission to explore ways to enhance the RDA process – for instance, by devising more definitive mechanisms for communicating when an RDA matter has officially "been closed" and/or reached conclusion – to ensure that there is a consistent process in place for the closing out of RDAs.

CONCLUSION

Given the wireless industry's ongoing commitment to accessibility, the Commission should report to Congress that the CVAA has succeeded in making advanced communications services, as well as a variety of other services and products, accessible to and usable by people with disabilities.

Respectfully submitted,

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