

# VIA ECFS

August 4, 2020

Marlene H. Dortch, Secretary Office of the Secretary Federal Communications Commission 445 12<sup>th</sup> Street, S.W. TW-A325 Washington D.C. 20554

**Re:** Consumer and Governmental Affairs Bureau Seeks Comment On Tentative Findings for the 2020 Twenty-First Century Communications and Video Accessibility Act Biennial Report [CG Docket No. 10-213]

Dear Ms. Dortch:

Enclosed for filing in the above referenced Public Notice are comments of the Rehabilitation Engineering Research Center for Wireless Inclusive Technologies (Wireless RERC).

Should you have any questions concerning this filing, please do not hesitate to contact me via email at <u>helena.mitchell@cacp.gatech.edu</u>.

Respectfully submitted,

Helena Mitchell Principal Investigator, Wireless RERC Center for Advanced Communications Policy Georgia Institute of Technology

Enclosure

## COMMENTS OF GEORGIA INSTITUTE OF TECHNOLOGY (GEORGIA TECH), CENTER FOR ADVANCED COMMUNICATIONS POLICY (CACP) AND THE REHABILITATION ENGINEERING RESEARCH CENTER FOR WIRELESS INCLUSIVE TECHNOLOGIES (WIRELESS RERC)

#### INTRODUCTION

The Georgia Institute of Technology's Center for Advanced Communications Policy (CACP), in collaboration with the Rehabilitation Engineering Research Center for Wireless Inclusive Technologies<sup>1</sup> (Wireless RERC), hereby submits comments to the Public Notice seeking comment on the *2020 CVAA Preliminary Findings Report* [CG Docket No. 10-213], released on July 21, 2020. CACP is the home the Wireless RERC, funded since 2001, the Wireless RERC's mission is *to integrate established wireless technologies with emerging wirelessly connected devices and services for a transformative future where individuals with disabilities achieve independence, improved quality of life, and enhanced community participation.* 

One of the aims of the Wireless RERC is to provide substantive input to regulatory agencies and other interested stakeholders to reduce access barriers and increase the development and deployment of accessible wireless products and services. We accomplish this by understanding user expectations and experiences concerning current and emerging wireless technologies and services and promoting adoption and meaningful use by end-users. We have been cited more than 200 times in written comments and testimony. We continue to monitor regulatory activities, generate research papers, and collaborate with experts from the wireless industry and disability community stakeholders.

In anticipation of this Public Notice, the Wireless RERC conducted a 2019/20<sup>2</sup> Mobile Phone Accessibility Review (Accessibility Review/Review). The Review included mobile phone models available in 2019 and up to February 2020 from the top four wireless carriers, one

<sup>&</sup>lt;sup>1</sup> The Rehabilitation Engineering Research Center for Wireless Inclusive Technologies (Wireless RERC) is sponsored by the National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR grant number 90RE5025-01). NIDILRR is within the Administration for Community Living (ACL), Department of Health and Human Services (HHS). The contents of this filing do not necessarily represent the policy of NIDILRR, ACL, HHS, and you should not assume endorsement by the Federal Government.

<sup>&</sup>lt;sup>2</sup> Phone models were identified in October 2019, and again in February 2020, at which time, additional phone models were available.

prepaid carrier, and five Lifeline Carriers.<sup>3</sup> Our initial comments submitted in April were based on the analysis of a subsample of Lifeline-provided mobile phones. **For this filing, however, we are providing input based on the complete sample, which includes phone models from all provider types.** Researchers, using the providers' web pages as a reference, identified 141 mobile phones for evaluation. Data were collected on the presence of 35 features that impact accessibility and/or were designed to provide access to people with vision, hearing, cognitive and mobility disabilities. Sources of accessibility feature data included the Mobile Manufacturers Forum Global Accessibility Reporting Initiative (GARI) database,<sup>4</sup> user manuals from several different sites,<sup>5</sup> and phonescoop.com. With the exception of the FM Radio feature and the wireless emergency alert (WEA) message feature, the features identified for the study include those that are used to access a given phone, the content displayed on the phone, to connect to external assistive technology (AT), or other smart devices that can be controlled via the phone.

#### **Study Limitations**

A limitation of the results of this Accessibility Review is that the 35 features included in the Review are not an exhaustive list of the way consumers adapt features of the phone for their own use. Consumers use device features in novel ways to improve access. For example, the cameras on smartphones can be used as QR code readers to access print materials in an electronic format, which can improve information access by people with vision and print disabilities. However, that feature was not assessed in the study.

Another limitation of the results that has persisted across all data collection periods (2015, 2017, and 2019/20), is that for many of the features, information about whether it was present on a given phone could not be found using three consumer-facing sources. Thus, we cannot conclusively state that the features *are* or *are not* present. This difficulty in locating information about certain features is in itself important to note, as consumers with disabilities may experience a similar problem when comparing and purchasing phone models. While people without disabilities can compare phone models based on preferences, people with disabilities may have functional limitations that necessitate certain accessibility features for the phone to be

<sup>&</sup>lt;sup>3</sup> A random number generator was used to select five Lifeline carriers for inclusion in the review.

<sup>&</sup>lt;sup>4</sup> The GARI is a project of the Mobile & Wireless Forum (MWF). Some of the data referred to in this paper was sourced from the information available from the GARI website <u>www.gari.info</u> and used with permission of the MWF, although all views and conclusions are the authors alone.

<sup>&</sup>lt;sup>5</sup> These sites include the carrier's webpage and the phone's manufacturer.

usable by them (e.g., video calling, screen reader, AT connection). If a user with a disability is not easily able to find the features he or she needs, then the consumer might purchase a phone that is not fully accessible to them, or not purchase a phone model that would have been accessible to them. Notwithstanding the limitations of this study, the results provide a snapshot of the accessibility of a sample of mobile phone models commercially available in 2019 through April 2020.

The Wireless RERC's cornerstone survey on wireless technology use by people with disabilities, the Survey of User Needs (SUN), has been completed by over 8,000 consumers with disabilities since it was first launched in 2001. Subsequent iterations of the survey have been updated in response to changes in technology. In addition to questions about cell phone and tablet use, the current version of the SUN collects information about wearables, smart home technologies, and other next-generation wirelessly connected devices. The SUN's data collection period aligns with the FCC's interest in assessing *current* mobile device accessibility. Unless otherwise noted, the comments made herein share the results of the SUN and related focus group work, and the results of the Accessibility Review.

#### **RESPONSE TO SECTION I - COMPLIANCE WITH SECTIONS 255, 716, AND 718, ¶ 2**

Over the 19 years that the Wireless RERC has been researching the accessibility of wireless devices, mobile phone and wirelessly connected device adoption by people with disabilities has steadily increased, as has the accessibility and usability of the devices. As we have observed and celebrated accessibility gains, we continue to find that some gaps remain. The Accessibility Review results indicated disparities in the number of accessibility features based on disability type. For people with vision disabilities, the study analyzed 17 features. In contrast, the study identified twelve applicable accessibility features for people with cognitive disabilities, nine for people with hearing disabilities, and seven for people with mobility/dexterity features. The variance in accessibility features in mobile devices highlights that between disabilities, there are differential access challenges. These differences are also reflected in other mobile phone accessibility databases, except with cognition-related features having the lowest number and vision having the greatest. Awareness that these variations exist may provide developers, manufacturers, and other industry participants with opportunities to enhance their design of these devices.

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We also note that having more than one disability (i.e., comorbidity) makes identifying an appropriate mobile device more complex, particularly if they are the disabilities that have a fewer number of associated accessibility features. For example, an individual with comorbidities, possibly caused by a condition like diabetes, may have mobility and vision limitations and be confronted with making a choice between a mobile phone that is better apt to assist with one functional limitation but not the other. Then, considering how many phones are cost-prohibitive,<sup>6</sup> the study acknowledges that despite the growth in accessibility features, other factors can contribute to the exclusion of some people with disabilities. Again, this holds for designers as well as end-users.

Following are the aggregated and disaggregated results. These data support the FCC's preliminary findings that yes, progress has been made, and also yes, some gaps persist. The left axis reflects the percent of phones/devices that a given feature is present on.



#### Figure 1: All Accessibility Features (2019/20)

<sup>&</sup>lt;sup>6</sup> In response to growing digital divide, the Lifeline program ensures "low-income consumers in every state, territory, commonwealth, and Tribal lands" have access to both broadband and mobile phones services. Online at: <u>https://www.fcc.gov/general/lifeline-program-low-income-consumers</u>. Despite the presence of this program, there is relatively low participation in the Lifeline program (Appendix A), likely due to limited awareness which the COVID-19 pandemic has highlighted. Online at: <u>https://themarkup.org/ask-the-markup/2020/05/14/is-the-u-s-governments-lifeline-phone-service-really-a-lifeline</u>

Thompson, S. (2018). Mobile technology and inclusion of persons with disabilities. Online at: https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/13834

## **Longitudinal Comparison**

For the 2020 report, ten more accessibility features were assessed than were in 2017. The accessibility features included in both data collection periods showed growth in the percentage of phones that carried these features.

Feature	2017	2019	Difference
Biometric Login	27%	80%	53 points
Vibration Adjustment	31%	74%	43 points
Near Field Communications (NFC)	27%	61%	34 points
Built-In TTS	47%	76%	29 points
Headphone Jack	64%	92%	28 points
Full Access Screen Reader	30%	57%	27 points
Touch Input	66%	91%	25 points
Voice Input	66%	87%	21 points
Captions	36%	56%	20 points
2-Way Video	42%	61%	19 points

Table 1: Comparison of Accessibility Features - Top 10 Steepest Percentage Point Differentials

The growth of accessibility features between 2017 and 2019 shows a shift towards the integration of novel and more advanced technology. As society moves towards contactless interactions and better device security, technologies such as NFC and biometric logins, people with disabilities will continue to see the secondary effects of improved accessibility of mobile phones. This underscores the importance of continuing to incorporate users with disabilities into all stages of the design process so that accessibility is intentional within digital designs instead of a fortuitous byproduct of innovative technology.



Figure 2: Comparison of Accessibility Features between 2017 and 2019/20<sup>7</sup>

<sup>&</sup>lt;sup>7</sup> This chart only shows features assessed both in 2017 and 2019.

## Assistive Technology (AT) Connections

Having multiple ways to connect a device to external AT is critical for some people with disabilities' use of a smartphone. As shown in Figure 3, of all mobile phones in the sample, 99% had USB capabilities, 97% had Bluetooth, while 92% had a headphone jack, 61% had NFC, 25% had Mirror Link, and 1% had Infrared (IR). AT connections are particularly pertinent to those who are blind who use refreshable Braille displays, those with quadriplegia, who use switch access, or individuals who utilize neck-loops to amplify sounds. Connectivity options such as Mirror Link, NFC, and Infrared allow users to connect to their vehicles, perform cashless transactions, and utilize a smartphone as a universal remote. Furthermore, Bluetooth technology is increasingly used to connect smartphones to smart prosthetic devices and hearing aids.<sup>8,9,10</sup>

The continued incorporation of features that enable device-to-device connectivity will not only support people with disabilities' use of external assistive technologies but is supportive of their use of Internet of Things (IoT) devices and services that advance independent living and social inclusion.





#### Accessibility by Disability Type

The Accessibility Review examined accessibility features for four disability types: vision, hearing, cognitive, and mobility/dexterity.

<sup>&</sup>lt;sup>8</sup> See <u>http://www.wirelessrerc.gatech.edu/over-counter-hearing-aids-promise-reduce-accessibility-costs</u>

<sup>&</sup>lt;sup>9</sup> See http://www.wirelessrerc.gatech.edu/google-developing-native-hearing-aid-support-android

<sup>&</sup>lt;sup>10</sup> See <u>https://about.att.com/story/2018/connected\_prosthetic.html</u>

#### Accessibility Features for Vision Disabilities

In evaluating the accessibility features for vision disabilities, the study focused on the percentage of phones that had individual features that improve access for people with vision disabilities. As shown in Figure 4, 89% of phones had adjust font; 87% voice input; 84% screen magnifier; 80% biometric log-in; 79% accessibility menu; 76% built-in TTS; 74% digital assistant; 64% contrast adjustment; 61% color contrast; 57% full access screen reader; 50% color inversion; 35% dark theme; 32% grayscale; 30% braille access; 23% FM radio; 17% physical # keypad; 15% procure TTS; 9% physical QWERTY keyboard.



#### Figure 4: Accessibility Features for Vision Disabilities (2019/20)

Figure 5 shows the change in the presence of vision-related accessibility features between the 2017 and 2019/20 data sets.

Figure 5: Comparison of Accessibility Features for Vision Disabilities Between 2017 and 2019/20



Following is a breakdown of the presence of features with percentage point changes since 2017.

# Percentage point increases since 2017:

- 80% biometric login, a 53-point increase
- 76% built-in TTS, a 29-point increase
- 57% full access screen reader, a 27-point increase
- 87% voice input, a 21-point increase
- 30% braille access, a 20-point increase
- 89% adjust font, an 18-point increase
- 15% procure TTS, a 14-point increase
- 64% contrast adjustment, a 12-point increase

# Percentage point decreases since 2017:

- 23% FM radio, a 12-point drop
- 17% physical # keypad, an 11-point drop
- 9% physical QWERTY keyboard, a 5-point drop

# 2019/20-only data:

- 84% screen magnifier
- 79% accessibility menu
- 74% of phones had a digital assistant
- 61% color contrast
- 50% color inversion
- 35% dark theme
- 32% grayscale

These data suggest a general trend towards improved accessibility and,

coincidentally, increased *usability*, for people with vision disabilities, particularly with regards to input, output, and display customization features. Braille access and biometric

login had the most significant percentage point increase. Five of the features are assistive to people with color perception difficulties.

#### Accessibility Features for Hearing Disabilities

Figure 6 illustrates the accessibility features and phone characteristics that are important for people with hearing disabilities. Touch input was included as an input alternative to voice input, and Bluetooth was included because of the availability of Bluetooth connected hearing aids. Hearing Aid Compatibility is discussed separately, and results shown in Figure 8. Ninetynine percent (99%) of phones had customizable volume, 97% of phones had Bluetooth, 91% had touch input, 79% had an accessibility menu, 61% of phones had 2-way video capabilities, 56% had the caption feature, and 23% had real-time text.



Figure 6: Accessibility Features for Hearing Disabilities (2019/20)

Figure 7 shows the change in the presence of vision-related accessibility features between the 2017 and 2019/20 data sets.





Following is a breakdown of the presence of features with percentage point changes since 2017

#### **Percentage point increases:**

- 80% biometric login, a 53-point increase
- 74% vibration adjustment, a 43-point increase
- 90% touch input, a 24-point increase
- 56% captions, a 20-point increase
- 60% 2-way video, an 18-point increase
- 97% Bluetooth, a 6-point increase

#### 2019/20-only data:

- 99% customizable volume
- 78% accessibility menu
- 22% real-time text

These data suggest a general trend towards improved accessibility for people with hearing disabilities. In 2019, phone manufacturers introduced real-time text (RTT). As it is a relatively new accessibility feature, we expected a low presence, and the study's findings support this as only 23% of sampled phones included RTT. There was an increase in the availability of two-way video capability. This feature is essential for people who are Deaf and whose primary language is American Sign Language (ASL). If communicating in ASL is not a preference but a requirement for effective communications, then for people who are Deaf, 60% of the phones in the sample would be appropriate for their communication needs.

#### Hearing Aid Compatibility (HAC) Ratings

Another phone characteristic that is important for people who use hearing aids or cochlear implants is the HAC rating. Without a HAC compliant device, a user with a hearing aid

or cochlear implant would experience interference. HAC ratings were found for 98% of the sample, which is an increase of 18% from the 2017 sample. Out of the 138 mobile phones<sup>11</sup>, all had at least a HAC rating of M3 or T3, on a scale of 1 to 4, with four being considered excellent.<sup>12</sup> As shown in Figure 10, M4/T3 ratings account for 39% of the sample, M3/T4 (24%), M4 (20%), M4/T4 (14%), N/A (2%), M3 (1%), M3/T3 (0%).



Figure 8: HAC Ratings (2019/20)

Compared to the HAC ratings found in 2017, the percentage of phones that were HAC compliant noticeably improved. The ratings shifted from a majority of devices falling into the M3/T3 category in 2017, to a majority of the mobile phones landing into the M4/T3 rating in 2019/20. Figure 9 highlights the growth in HAC-compliance from "good" to "excellent." Also noteworthy is the increased transparency by mobile phone manufacturers to clearly indicate the HAC ratings of phones. The graph illustrates this as the percentage of mobile devices labeled "N/A" in 2017 (21%) decreased by 19 points in 2019/20 (2%).

<sup>&</sup>lt;sup>11</sup> Researchers were able to identify HAC ratings for 138 of the 141 phones in the sample.

<sup>&</sup>lt;sup>12</sup> The M and T in the HAC ratings stand for microphone and telecoil. M3 or T3 is considered good and M4 or T4 is considered excellent.

Figure 9: Comparison of HAC Ratings (2017 v 2019)



If one wanted a phone with an excellent microphone HAC rating, they could select from 53% of the phones in the sample (up from 29% in 2017). For an excellent telecoil HAC rating, they could select from 34% of the phones in the sample (up from 30% in 2017). Some hearing aids, however, have both microphones and telecoils, and users can switch between the M and T settings depending on the listening situation. These users would need a device with a dual M/T HAC rating. While the majority of the phones had dual ratings, only 16% of the phones in the sample had excellent M and T ratings (M4/T4).

#### Accessibility Features for Cognitive Disabilities

Figure 10 illustrates accessibility features and phone characteristics that may improve the usability of the device for people with cognitive disabilities, as well as older adults. Of the sampled mobile phones, 89% had adjust font, 87% had voice input, 80% had biometric login, 79% had an accessibility menu, 76% had built-in TTS, 75% had a digital assistant, 64% of phones had contrast adjustment, 61% color contrast, 57% full-access screen reader, 50% color inversion, 34% simple display, 15% procure TTS. Features for customizing the display, the appearance of on-screen text, and alternative logins can be assistive to people with cognitive disabilities, as they allow for:

- Shorter word counts per line (adjust font),
- Auditory information processing (TTS and screen reader),
- Removal of distracting stimuli (simple display),
- Readability (color contrast and color inversion),
- Limiting dependence on typing (voice input and digital assistants), and
- Limiting dependency on memory (biometric login).



Figure 11 shows the change in the presence of cognitive-related accessibility features between the 2017 and 2019/20 data sets.



Figure 11: Comparison of Accessibility Features for Cognitive Disabilities Between 2017 and 2019/20

Following is a breakdown of the presence of features and percentage point changes since 2017.

# Percentage point increases:

- 80% biometric login a 53-point increase
- 76% built-in TTS a 28-point increase
- 57% full access screen reader a 27-point increase
- 87% voice input, a 20-point increase
- 89% adjust font, a 17-point increase

- 64% contrast adjustment a 12-point increase
- 15% procure TTS a 13-point increase
- 34% simple display, a .4-point increase<sup>13</sup>

## 2019/20-only data:

- 79% accessibility menu
- 74% had digital assistants
- 61% color contrast
- 50% color inversion

These data indicate an increase in the percentage of phones with features available for people with cognitive disabilities. Specifically, for people who use the voice output features and the alternative login, there was a significant increase in the presence of TTS, full access screen readers, and biometric login.

## Accessibility Features for Mobility/Dexterity Disabilities

Figure 12 illustrates accessibility features and phone characteristics that may improve the accessibility of the device for people with mobility and dexterity disabilities. In the Review, seven features were intended to aid people living with mobility/dexterity disability in unlocking, navigating the device, and interacting with external systems. Eighty-seven (87%) of phones had voice input, 80% had biometric login, 79% accessibility menu, 74% digital assistants, 61% had NFC, and 50% of phones had switch control, a feature designed to allow for hands-free navigation of a device. Only 34% had a simple display option, which is useful for people with dexterity disabilities who want to improve the ease of selecting icons. The percentage of phones with a simple display option remained flat across the two data collection periods.





<sup>13</sup> This study rounds to the nearest whole number for data values. In 2017, Simple Display was present in 33.64% of phones which was rounded to 34%. There was a minute increase between the two years of study (2017 v 2019/20).

Figure 13 shows the change in the presence of mobility/dexterity-related accessibility features between the 2017 and 2019/20 data sets.



Figure 13: Comparison of Accessibility Features for Mobility/Dexterity Disabilities (2017 v 2019/20)

Following is a breakdown of the presence of features and percentage point changes since 2017.

## **Percentage point increases:**

- 80% biometric login a 53-point increase
- 87% voice input, a 21-point increase

# 2019/20-only data:

- 79% accessibility menu
- 75% digital assistant
- 61% near-field communications
- 50% switch control

To close this section, we reiterate that while accessibility is trending up, but when the presence of accessibility features is compared across disability types, their rates of inclusion across devices is variable. This finding is significant in that many people with disabilities report living with more than one type of disability. Our Survey of User Needs respondents indicated a diverse range of functional abilities, with 30% reporting three or more difficulties; and 18% reporting four or more. Given the rate of people with disabilities reporting more than one disability, it is exceedingly important to increase the percentage of more universally accessible devices.

# **RESPONSE TO SECTION A1, ACCESSIBILITY, TELECOMMUNICATIONS AND ADVANCED COMMUNICATION SERVICES AND EQUIPMENT**

## **Response to ¶4**

(1) smartphones continue to innovate and deploy technologies and features that enable improved access to telecommunications and advanced communications services of not only smartphones but other devices used by people with disabilities; (2) speech-to-text and text-to-speech technology, voice assistants, and screen readers continue to improve; ... We also tentatively find that accessibility gaps remain.<sup>14</sup>

The above-detailed data from the Accessibility Review and focus group research of the Wireless RERC supports the above preliminary finding. Professionals and individuals with intellectual and developmental disabilities (IDD) agreed that the speech-to-text function on phones is a useful support for connecting online.<sup>15</sup> An individual with IDD shared the following example: "I would say the voice technology. It's very beneficial... because, for example, [colleague] has a challenge in his reading and writing. But he doesn't have any issue to text or even to post on Facebook or to do anything, send emails, because he's using the voice technology."

## **Response to ¶ 5 Smartphones and ¶ 7 Non-Smartphones (or Feature Phones)**

Prior studies demonstrated how integral smartphones are to people with disabilities in executing daily life activities.<sup>16,17,18</sup> As such, their increased levels of accessibility stand to deepen these devices' significance to task performance, productivity, social connections, and of course, information and communications access. However, it is important to note that some users with disabilities may prefer non-smartphones, so accessibility for these types of phones should be given equal consideration. SUN data showed that 13% of respondents with disabilities were

<sup>&</sup>lt;sup>14</sup> FCC. (2020). Tentative findings for the 2020 biennial report to congress as required by the CVAA. Available at <u>https://www.fcc.gov/document/fcc-seeks-comment-tentative-findings-2020-cvaa-biennial-report</u>

<sup>&</sup>lt;sup>15</sup> Donehower P. C., Jimenez, E., & Vinoksi, T. E. (2020). Technology use for social connectedness: Exploring the experiences of people with intellectual and developmental disabilities, family members, and professionals [Research Brief]. *Wireless RERC*, 20(1). Available at <a href="http://www.wirelessrerc.gatech.edu/sites/default/files/technology">http://www.wirelessrerc.gatech.edu/sites/default/files/technology</a> use for social connectedness research brief ervt 5.19.2020 00000004.pdf

<sup>&</sup>lt;sup>16</sup> DePompei, R., Gillette, Y., Goetz, E., Xenopoulos-Oddsson, A., Bryen, D., & Dowds, M. (2008). Practical applications for use of PDAs and smartphones with children and adolescents who have traumatic brain injury. *NeuroRehabilitation*, 23(6), 487-499.

<sup>&</sup>lt;sup>17</sup> Lancioni, G. E., Singh, N. N., O'Reilly, M. F., Sigafoos, J., Alberti, G., Zimbaro, C., & Chiariello, V. (2017). Using smartphones to help people with intellectual and sensory disabilities perform daily activities. *Frontiers in public health*, 5, 282.

<sup>&</sup>lt;sup>18</sup> Morris, J. T., PhD, Sweatman, M., PhD, & Jones, M. L., PhD. (2017). Smartphone Use and Activities by People with Disabilities: User Survey 2016. Retrieved from <a href="http://scholarworks.csun.edu/bitstream/handle/10211.3/190202/JTPD-2017-p50-66.pdf?sequence=1">http://scholarworks.csun.edu/bitstream/handle/10211.3/190202/JTPD-2017-p50-66.pdf?sequence=1</a>

users of non-smartphones.<sup>19</sup> While non-smartphones have fewer accessibility options, for some, the physical input options present (e.g., number keypad) offer the accessibility they are seeking as they may have no interest in using their mobile phone for anything other than a communication device.

Mobile phone accessibility features were evaluated by phone type: smartphone or nonsmartphone (Figure 14). Eighty-eight percent (88%) of the phones in the 2019/20 Accessibility Review sample were smartphones, and 12% were non-smartphones. The results indicate that both phone types contained features that can be assistive to people who are blind, have low vision, cognitive disabilities, and/or physical disabilities. In the smartphone subsample, the most frequently incorporated (top five) features were Bluetooth (100%), Touch Input (100%), USB (99%), Customizable Volume (99%), and Voice Input (95%). For the non-smartphones subsample, the top five features included Physical Keypad (100%), Headphone Jack (100%), Customizable Volume (100%), USB (100%), Bluetooth (76%).



Figure 14: Comparison of Smartphone and Non-Smartphone Features (2019/20)

Smartphones outperformed non-smartphones in the percentage of accessibility features present, pulling higher percentages for 26 of the 35 features examined, showing that smartphones

<sup>&</sup>lt;sup>19</sup> Moon, N. W., Griffiths, P. C., LaForce, S., Linden, M., "Wireless device use by individuals with disabilities: Findings from a national survey," <u>Journal on Technology & Persons with Disabilities</u>, vol 8, pp 196-209, June 2020.

not only have a greater variety of accessibility features, but they outperform non-smartphones in many categories of accessibility. Six features, including infrared, mirror link, braille access, dark theme, NFC, and biometric login, were only available in smartphone models. Figure 14 demonstrates a noteworthy phenomenon: non-smartphones can have advanced features. Twelve percent (12%) of non-smartphones had digital assistants, and 18% of non-smartphones had real-time text (RTT). **To better compete with smartphones, it appears that non-smartphone manufacturers are integrating popular smartphone features into their core models.** 

Of the features that were present in both phone types, the ones with the steepest differentials are shown in Table 2. These data indicate that consumers with disabilities seeking to purchase smartphones have more device options with a greater variety of accessibility features. Of concern, however, is that some users prefer non-smartphones for their perceived durability<sup>20</sup> and cost-differential. This preference could inhibit access to WEA messages since only 41% of non-smartphones were WEA-capable compared to 77% of smartphones.

Feature	Non %	Smart %	Difference
Physical Number Keypad	100%	5%	95 points
Biometric Log-In	0%	90%	90 points
Touch Input	24%	100%	76 points
Digital Assistant	12%	83%	71 points
Near Field Communications	0%	69%	69 points
Voice Input	29%	91%	65 points
2 Way Video	6%	69%	63 points
Full Access Screen Reader	29%	91%	61 points
Switch Control	6%	56%	50 points
Accessibility Menu	35%	84%	49 points

Table 2: Comparison of Non-smartphones to Smartphones - Top 10 Steepest Percentage Point Differentials

Looking at HAC separately, the non-smartphones sampled had the greatest percentage of phones with dual M4/T4 ratings (41% compared to 10%) and M3/T4 ratings (35% compared to 18%). Whereas the smartphones sampled had greater percentages of phone models with M3/T3

<sup>&</sup>lt;sup>20</sup> Mitchell, H., LaForce, S., Moon, N., Baker, P.M.A., Garcia, A., & Jacobs, B. (2018, May 3). Comments submitted in response to the Public Notice in the Matter of The Accessibility of Communications Technologies for the 2018 Biennial Report Required by the Twenty-First Century Communications and Video Accessibility Act [CG Docket No. 10-213, Consumer and Governmental Affairs Bureau]. Federal Communications Commission: Washington, D.C.



HAC ratings (28% compared to 6%) and M4/T3 HAC ratings (43% compared to 6%).

The Preliminary Findings Report states that "ACB, CTIA, and the Wireless RERC disagree about whether feature phones provide sufficient accessibility features."<sup>21</sup> To clarify, research conducted by the Wireless RERC supports the observation that accessibility is a moving and morphing target. What is considered accessible to one user may be a barrier to another. For example, recent focus groups exploring the use of wireless technologies to promote social connectedness among individuals with IDD revealed that some respondents indicated that digital assistants (e.g., Siri, Alexa, Google Assistant) were beneficial in accessing technology for social connectedness.<sup>22</sup> Conversely, others noted that digital assistants could present barriers: "[my child] who has cerebral palsy has kind of a speech [issue]. So, things like Siri or OK, Google can't fully understand him. So I wish that there was something that could remedy that.<sup>23</sup>"

# Figure 15: Comparison of Smartphone and Non-Smartphone HAC Ratings

# Response to ¶ 8

The Preliminary Findings Report noted that "According to the Wireless RERC, which reviewed 92 Lifeline-provided phones for its comments, the discrepancy in accessibility between smartphones and feature phones mostly impacts Lifeline consumers, but the Wireless RERC also

<sup>&</sup>lt;sup>21</sup> FCC. (2020). Tentative findings for the 2020 biennial report to congress as required by the CVAA. Available at <u>https://www.fcc.gov/document/fcc-seeks-comment-tentative-findings-2020-cvaa-biennial-report</u>

<sup>&</sup>lt;sup>22</sup> Donehower P. C., Jimenez, E., & Vinoksi, T. E. (2020). Technology use for social connectedness: Exploring the experiences of people with intellectual and developmental disabilities, family members, and professionals [Research Brief]. *Wireless RERC*, 20(1). Available at <a href="http://www.wirelessrerc.gatech.edu/sites/default/files/technology\_use\_for\_social\_connectedness\_research\_brief">http://www.wirelessrerc.gatech.edu/sites/default/files/technology\_use\_for\_social\_connectedness\_research\_brief</a> ervet 5.19.2020 00000004.pdf

<sup>&</sup>lt;sup>23</sup> Ibid.

notes that the accessibility of these phones has improved compared to 2017 data."24 While we maintain that the accessibility of Lifeline provided phones has improved since 2017, the FCC's interpretation above, that the accessibility gaps between smartphones and non-smartphones "mostly impacts Lifeline consumers," is a misunderstanding of the data presented. Our earlier comments indicated that "These data indicate that consumers with disabilities seeking to purchase smartphones via the Lifeline program have more device options with a greater variety of accessibility features. Of concern, however, is that some users prefer non-smartphones for their perceived durability. This preference would (a) limit their device options, as only 11% of the devices in the sample were non-smartphones and (b) inhibit access to WEAs since only 44% of non-smartphones in the sample were WEA-capable compared to 87% of smartphones.<sup>25</sup>" Our initial comments provided input based on the analysis of the subsample of Lifeline-provided mobile phones. In this filing, we were able to use our complete sample, which includes Tier 1 provided devices, Lifeline devices, and pre-paid carrier-provided devices. The detailed results of which are reported in response to paragraphs four and five above, and reiterated here to clarify that the accessibility gap between smartphones and non-smartphones is not relegated to just Lifeline subscribers.

Smartphones outperformed non-smartphones in the percentage of accessibility features present, pulling higher percentages for 26 of the 35 features examined. These data indicate that consumers with disabilities seeking to purchase smartphones have more device options with a greater variety of accessibility features. Of concern, however, is that some users prefer non-smartphones for their perceived durability,<sup>26</sup> and this preference could inhibit access to WEA messages since only 41% of non-smartphones were WEA-capable compared to 77% of smartphones.

<sup>&</sup>lt;sup>24</sup> FCC. (2020). Tentative findings for the 2020 biennial report to congress as required by the CVAA. Available at <u>https://www.fcc.gov/document/fcc-seeks-comment-tentative-findings-2020-cvaa-biennial-report</u>

<sup>&</sup>lt;sup>25</sup> LaForce, S., Bright, D., Moon, N., Helena, M., Baker, P.M.A. (2020, April 14). Comments submitted in response to the Public Notice in the Matter of The Accessibility of Communications Technologies for the 2020 Biennial Report Required by the Twenty-First Century Communications and Video Accessibility Act [CG Docket No. 10-213, Consumer and Governmental Affairs Bureau]. Federal Communications Commission: Washington, D.C.

<sup>&</sup>lt;sup>26</sup> Mitchell, H., LaForce, S., Moon, N., Baker, P.M.A., Garcia, A., & Jacobs, B. (2018, May 3). Comments submitted in response to the Public Notice in the Matter of The Accessibility of Communications Technologies for the 2018 Biennial Report Required by the Twenty-First Century Communications and Video Accessibility Act [CG Docket No. 10-213, Consumer and Governmental Affairs Bureau]. Federal Communications Commission: Washington, D.C.

#### **Response to ¶9 Apps and Software Upgrades**

The Wireless RERC agrees with the tentative findings regarding system updates negatively impacting the users' configuration of accessibility features on smartphones and apps. During focus groups that explored accessibility, usability, social appropriateness, and cultural acceptability issues of wireless technology-related use among individuals with disabilities, a consistent issue raised was the problem of updates to the device operating systems (OS) and apps that had subsequent effects on device accessibility. Users frequently noted that a previously accessible app or feature could be "broken" following a routine operating system update. While users developed a variety of strategies for dealing with this issue, ranging from reading and memorizing all of the documentation to relying on online communities, ultimately, simple trial and error was the main way of determining changes to accessibility following updates.<sup>27</sup>

At the same time, others' apprehension regarding system updates resulted in delaying (or never) updating the phones and/or apps. The latter behavior could negatively impact the security of the device as many OS and app updates incorporate greater levels of device security and bug fixes. As such, efforts to ensure that systems updates are able to maintain user changes and not reset the device to the default status would not only impact accessibility and usability, but also (1) the security of the device for people with disabilities, and (2) the optimal operation of the device or app, as it won't have the latest fixes and features.

# **RESPONSE TO SECTION II ACCESSIBILITY BARRIERS TO NEW COMMUNICATIONS TECHNOLOGIES ¶15**

The emergence and continued refinement of voice control, coupled with intelligent agents, may represent the single greatest facilitator for accessibility and usability among many, but not necessarily all, users with disabilities. Voice-based control, also known as voice assistants, for both Apple iOS and Google Android-based smartphones, as well as "smart speakers" such as Amazon Echo with Alexa, Apple HomePod with Siri, and Google Home with Google Assistant, was the most commonly cited feature used by individuals with both visionrelated disabilities and dexterity-related disabilities. Users reported the use of smartphone

<sup>&</sup>lt;sup>27</sup> Moon, N., Baker, P. M. A., & Goughnour, K. (2018). Accessibility, Usability, and Social and Cultural Acceptance of Next-Generation Wireless Devices [Research Brief]. *Wireless RERC*, 18(1). Available at <u>http://www.wirelessrerc.gatech.edu/sites/default/files/publications/wireless-rerc-research-brief-18-01-1.pdf</u>

intelligent agents, including their ability to provide calendar and scheduling information, weather updates, and location and navigation-based information for wayfinding, as essential features.<sup>28</sup>

However, the degree of control or customizability was a factor in voice control. For devices such as the Philips Hue, Nest, and Ecobee, the smartphone app provided more options for user settings. By contrast, voice control, which was deemed important for this group, did not provide as many options. Another user noted that she appreciated being able to turn her Philips Hue lights on and off through her Alexa-enabled control. However, she also reported that features such as the ability to specify which, from among several, lightbulbs to turn on or off, or dimming control, were not available to her through voice, and she could not utilize the app in the smartphone. This case suggests a broader issue of user perception of the features and capabilities of technologies. According to documentation from Philips, this capability exists for Amazon Echo devices.<sup>29</sup> **Thus, voice input devices may be capable of more than users believe is the case, suggesting the need for improved or more expanded help/guidance functions.** Another possibility might be the need for a list of capacities installed or available, or a built-in expanded capacity of tips or "did you know" guidance. For example, "We noted that you are using Alexa to control your lighting. Did you know that ..."

# SECTION III COMPLAINTS PURSUANT TO SECTIONS 717 Response to ¶A22, Number and Nature of Complaints Received

In our evaluations of technology access, baseline accessibility, and subsequent usability, is consistently impacted by access to customer service and print and electronic materials furnished by industry and policymakers alike. To improve access to programs and services, we recommend that fundamental issues of disability culture awareness, familiarity with instructional materials regarding device accessibility and usability, and accessible formats be addressed. For example, the FCC's American Sign Language (ASL) Consumer Support Line was launched to provide programmatic access to consumers who are Deaf and hard of hearing and whose primary language is ASL. Before this, the Deaf and hard of hearing communities were only able to communicate with the FCC via relay services or through an online complaint form. Now, these consumers can use the video capabilities of their smartphones or in-home videophones, and a

<sup>&</sup>lt;sup>28</sup> Ibid.

<sup>&</sup>lt;sup>29</sup> See <u>https://www.philips-hue.com/en-us/works-with/amazon-alexa</u>

ten-digit number to connect to ASL Consumer Specialists to file formal complaints, as well as to inquire about telecommunications relay service (TRS), closed captioning, access to emergency information on television, and general telecommunication matters that could impact any consumer. Additionally, to reach the population of people whose primary language is ASL, the FCC's outreach and education are beginning to include ASL versions of materials otherwise presented in text and/or audio. We applaud the FCC's efforts and encourage the proliferation of ASL translated informational materials, and note that Wireless RERC research as well as anecdotal evidence from Wireless RERC partners, supports the value of ASL translated material.

We would strongly encourage that other organizations follow the FCC's lead in this respect, particularly at point of sale. Following the FCC's lead would help increase the accessibility of the point of sale experience, as the retail side of service providers and manufacturers (e.g., Apple Store) holds great power in setting the tone for the user's experience with their devices. Still, Wireless RERC research suggests they are failing to take advantage of these opportunities. While incredible progress has been made by industry with regard to having customer call centers with people specifically trained in accessibility matters, the in-person purchasing experience in some retail stores could be bolstered by better training of floor staff. Understandably, there is a high turnover rate of sales associates in retail establishments, but having (1) disability awareness/etiquette and accessibility features as a standard part of sales associate training and (2) a stable method for customers with disabilities to obtain in-person support during point of sale could help to improve the end-user experience dramatically. For example, making video remote interpreting services available to retailers would address individuals whose first language is ASL in communicating their device needs and wants at POS. We anticipate that some of the changes in work modes, such as remote work and video conferences, as a consequence of the COVID-19 pandemic, will diffuse to these retail settings.

#### **CONCLUSION AND RECOMMENDATIONS**

We commend the FCC's efforts to measure the impact of provisions of the *Twenty-First Century Communications and Video Accessibility Act of 2010* (CVAA) on gaps and gains in accessibility and to ensure that future technologies have innovations in accessibility and usability. The Wireless RERC is encouraged by the industry's growth in the accessibility of advanced communications technologies, as evidenced by the increasing presence and richness of new accessibility features on mobile devices, which can also result in greater usability of these devices. The data indicate that consumers with disabilities seeking to purchase smartphones have more device options with a greater variety of accessibility features. Particularly, accessibility for people who use the voice output features and the alternative login as there was a significant increase in the presence of TTS, full access screen readers, and biometric login. In addition, a number of accessibility characteristics of inclusively designed phones and devices might actually increase the *usability* of these devices, which can amplify the outcome of technical accessibility. While a given device might meet *accessibility* requirements, the particular implementation of a feature might, contrarily, reduce the *usability* of a given device increasing the likelihood of abandonment. Based on the data presented in these comments, the Wireless RERC offers the following recommendations:

- As new features are developed, mobile phone manufacturers are encouraged to continue to incorporate users with disabilities into all stages of the design process so that accessibility, and consequential usability, is intentional within digital designs instead of a fortuitous byproduct of innovative technology.
- Increasing the percentage of phones with excellent M and T ratings (M4/T4) would better ensure a quality experience with voice calls for people who use hearing aids and cochlear implants.
- Given the rate of people with disabilities reporting more than one disability, and the disparity between the availability of accessibility features based on disability type, increasing the percentage of more universally accessible devices would be good for manufacturers and end-users alike.
- Increasing the percentage of non-smartphones that are WEA-capable would better ensure access to emergency alerts for users with disabilities that prefer non-smartphones.
- For continuity of the accessibility experience through app and OS updates, more development efforts would allow a way to ensure that systems updates are more transparent for the end-user by not resetting to the default status. If this could be overcome, it would not only impact accessibility, but also (1) the security of the device for people with disabilities, and (b) the optimal operation of the device or app, as it would have the latest fixes and features.
- Voice input devices such as digital assistants and smart speakers, may be more capable than users believe is the case, suggesting the need for more informed or more expanded help/guidance functions. This speaks to the need for the design process to expand beyond

minimal accessibility features to incorporate outcome-based design, such as increased usability.

 To address barriers experienced by customers with disabilities during point of sale transactions, we recommend (1) disability awareness/etiquette and information about accessibility features should be a standard part of sales associate training, and (2) providing a stable method for customers with disabilities to obtain in-store support (e.g., video remote interpreting service.

In closing, we are confident that the continued commitment of the FCC and all the stakeholders will allow the promise of the CVAA to truly make technology evolution and innovation inclusive of all Americans.

Respectfully submitted,

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