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5 HEARING: DEFENDING AMERICA'S WIRELESS LEADERSHIP

6 FRIDAY, MARCH 10, 2023

7 House of Representatives,

8 Subcommittee on Communications and Technology,

9 Committee on Energy and Commerce,

10 Washington, D.C.

11

12

13 The Subcommittee met, pursuant to call, at 9:01 a.m., in
14 Room 2123, Rayburn House Office Building, Hon. Bob Latta
15 [Chairman of the Subcommittee] presiding.

16

17 Present: Representatives Latta, Bilirakis, Walberg,
18 Carter, Dunn, Curtis, Joyce, Weber, Allen, Balderson,
19 Fulcher, Pfluger, Harshbarger, Cammack, Obernolte, Rodgers
20 [ex officio]; Matsui, Clarke, Veasey, Soto, Eshoo, Cardenas,
21 Craig, Fletcher, Dingell, Kuster, and Pallone [ex officio].

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23 Staff present: Sarah Burke, Deputy Staff Director;
24 Slate Herman, Counsel, C&T; Nate Hodson, Staff Director; Tara
25 Hupman, Chief Counsel; Noah Jackson, Clerk, C&T; Sean Kelly,
26 Press Secretary; Peter Kielty, General Counsel; Emily King,
27 Member Services Director; Giulia Leganaski, Professional
28 Staff Member, C&T; John Lin, Senior Counsel, C&T; Kate
29 O'Connor, Chief Counsel, C&T; Michael Taggart, Policy
30 Director; Evan Viau, Professional Staff Member, C&T; Jennifer
31 Epperson, Minority Chief Counsel, C&T; Waverly Gordon,
32 Minority Deputy Staff Director and General Counsel; Tiffany
33 Guarascio, Minority Staff Director; Dan Miller, Minority
34 Professional Staff Member; Elysa Montfort, Minority Press
35 Secretary; Joe Orlando, Minority Senior Policy Analyst; Greg
36 Pugh, Minority Staff Assistant; Michael Scurato, Minority FCC
37 Detailee; and Johanna Thomas, Minority Counsel.
38

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39 *Mr. Latta. Well, the Subcommittee on Communications
40 and Technology will come to order. And the chair recognizes
41 himself for five minutes for an opening statement. But
42 before we do, I just want to take a point of personal
43 privilege to say to our former chairman of the full
44 committee, Mr. Walden, glad to see you here.

45 And a good -- again, good morning and welcome to today's
46 hearing on Defending America's Wireless Leadership. What we
47 are talking about today impacts Americans in every part of
48 our country, and properly managing our nation's spectrum
49 resources is an important responsibility. These public
50 resources fuel our economy, enable communication services,
51 empower important federal missions. As technology develops,
52 it is important that spectrum policy keeps pace and
53 efficiently maximizes the use of these finite resources by
54 unleashing innovation and protecting our national security.

55 Over the past year, this committee worked to improve
56 U.S. spectrum policy. Last Congress, I co-led the Spectrum
57 Innovation Act to accelerate commercial access to the lower 3
58 gigahertz band and extend the FCC's spectrum auction
59 authority. This range of frequencies is prime band spectrum

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60 that will improve mobile broadband speeds. The legislation
61 included -- included a measure championed by our good friend
62 from Kentucky, the chair of the Subcommittee on Health, that
63 would modernize our federal spectrum management process by
64 establishing an incumbent-informing capability at NTIA to
65 enhance commercial access to federal frequencies. Last week,
66 the House passed the -- our full committee chair's
67 legislation. The gentlelady from Washington would extend the
68 FCC's auction authority to May 19th, and we are going to be
69 talking about that, I'm sure, today and what happened last
70 night.

71 Unfortunately, the Senate failed to pass both the
72 Spectrum Innovation Act and Chair Rodgers' extension measure.
73 We must now work quickly to agree on a long-term extension of
74 spectrum auction authority that preserves congressional
75 oversight of spectrum policy and directs auction proceeds to
76 reduce the deficit and fund important initiatives. I look
77 forward to continuing working on this important issue. It is
78 also important to note that good spectrum policy is good for
79 our economy.

80 Our leadership in 4G added billions to our GDP, created

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81 tens of thousands of new jobs, and led to the development of
82 the app economy. Leaving the world and future generations of
83 wireless services ensures greater investment in next
84 generation technologies. This means we will have more job
85 and development opportunities right here in the United
86 States.

87 But the economic benefits do not end there. Auctioning
88 spectrum resources also yields significant monetary benefits.
89 Recent FCC auctions have netted over \$100 billion for the
90 U.S. Treasury, money that can be used to reduce our nation's
91 deficit and fund important priorities. In addition to making
92 more licensed spectrum available, we must also look for
93 opportunities to make unlicensed spectrum available. The
94 majority of American internet usage happens indoors, and the
95 use of unlicensed spectrum, such as Wi-Fi, plays a crucial
96 role in providing connectivity for homes and businesses.

97 One report estimates that unlicensed spectrum generates
98 over \$95 billion per year in a connected technology market.
99 Good spectrum policy is not only important for our economy,
100 but it is essential for American economic and national
101 security. American leadership on spectrum policy can lead to

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102 the private sector setting technology standards that benefit
103 American technological leadership. It means trusted
104 companies that can -- that develop economies of scale, create
105 jobs, ensure that the technology of the future promote
106 American values and priorities.

107 As we develop our spectrum policy, we need to help keep
108 -- we need to keep a number of principles in mind. First, we
109 need a balanced approach between licensed and unlicensed use
110 of spectrum. Both licensed and unlicensed spectrum are key
111 to bolstering U.S. technological leadership, and each
112 provides economic benefits for the American public. Next, we
113 need to ensure we are utilizing every tool at our disposal to
114 make spectrum available for commercial use. Advances in
115 technology have made spectrum-sharing more feasible, which
116 will become more important as the process for identifying
117 bands for auction, exclusive use, becomes more complex,
118 lengthy and expensive.

119 Finally, we need to restore trust through the
120 interagency spectrum coordination process. While federal
121 missions must be protected, the executive branch must speak
122 with one unified voice so that spectrum management decisions

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123 are not called into question. As we look to extend spectrum
124 auction authority and develop our spectrum policy, we need to
125 ensure that all stakeholders are involved early in the
126 process and that when decisions are made, agencies respect
127 those decisions. I look forward to hearing from our
128 witnesses. And again, I want to thank all of our witnesses
129 for appearing before us today.

130 [The prepared statement of Mr. Latta follows:]

131

132 *****COMMITTEE INSERT*****

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133 *Mr. Latta. And at this time, I yield back and will
134 recognize the ranking member of the subcommittee, the
135 gentlelady from the Seventh District of California, for five
136 minutes.

137 *Ms. Matsui. Thank you very much, Mr. Chairman. To say
138 this hearing comes at an unprecedented time is no
139 overstatement. We are here today under alarming
140 circumstances during a lapse in the FCC's auction authority,
141 something that has never happened before. Simply put, this
142 is a failure. And it was a completely avoidable failure.
143 Two weeks ago, the House passed a bipartisan bill to extend
144 the FCC's auction authority through May 19th.

145 This extension was intended to give us time to continue
146 negotiating while preserving the vital authority of the
147 Commission. Unfortunately, that bill fell on deaf ears. Not
148 only did the Senate decline to vote on the bill, but it
149 declined to vote on any extension. This is, in part, because
150 senators have been receiving conflicting messages from the
151 executive branch, a problem that has been plaguing
152 administrations of both parties for years.

153 A little more than two years ago, I sent my first letter

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154 to the incoming administration. It was a letter to
155 then-President-Elect Biden urging him to develop a unified
156 approach to spectrum policy and a clearly articulated process
157 resolving interagency disputes. I'll be entering this letter
158 into the record. It's just as relevant today as it was when
159 I sent it two years ago.

160 *Mr. Latta. Without objection.

161 [The information follows:]

162

163 *****COMMITTEE INSERT*****

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164 *Ms. Matsui. As I noted in the letter, more intensive
165 use of spectrum has a potential to cause friction among
166 federal agencies and commercial users. And to some extent,
167 this is unavoidable and healthy. Thoughtful debate about how
168 to best utilize our limited spectrum resources will lead to
169 better outcomes and more efficiency. But what can start as
170 collaboration can quickly turn to conflict.

171 When disagreements do arise, it is vital that all
172 agencies are aware of administration policy and understand
173 how to provide feedback in a constructive manner. But when
174 this process breaks down or doesn't exist, we end up where we
175 find ourselves today. The consequences of this lapse hold
176 the potential to be severe and far-reaching. It undercuts
177 economic growth and long-term national security. Companies
178 with service footprints across the country are eager to put
179 spectrum they acquired in the recent 2.5 gigahertz band to --
180 but this lapse jeopardizes that.

181 T-Mobile alone is waiting for the FCC to approve over
182 7,000 licenses with a collective value of more than \$300
183 million. In my district, they are waiting on five licenses
184 that could -- supporting home broadband and connecting

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185 underserved areas. But of course, the problem just doesn't
186 stop there. The global race to 5 and 6G is still quite hot.
187 Satellite broadband service is taking off, and Wi-Fi is
188 set to make strides that will be massive with consumers. If
189 the U.S. cedes ground to our global competitors in any one of
190 these spaces, the consequences can be measured in American
191 jobs and national security. On the heels of the Mobile World
192 Congress, we should all be reminded of just how competitive
193 the global wireless communications marketplace is. If the
194 United States and other market economies aren't setting the
195 pace for global harmonization, standard-setting and
196 innovation, we create a vacuum that China would happily fill.
197 And while the FCC's auction authority isn't alone
198 responsible for these issues, letting it lapse sets a
199 dangerous precedent for our government's values. Throughout
200 this debate, people have asked me would letting this
201 authority lapse really be that bad? My response has always
202 been I'm extremely concerned, and I think you should be too.
203 I'm concerned about the impact on licenses waiting to be
204 signed to slow erosion of long-standing jurisdictional
205 boundaries and the United States standing as the global

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206 innovation leader.

207 But I also think there is cause to be hopeful. This
208 subcommittee has shown a bipartisan willingness to tackle
209 tough issues that reinforce U.S. leadership like extending
210 the FCC's auction authority, for example. So I believe we
211 have a chance to continue that track record to promote
212 economic growth and national security. First and foremost,
213 we need to assure the federal government is a driving force
214 in maintaining a healthy spectrum pipeline. That means
215 reasserting the NTIA's role as statutory manager of spectrum
216 and developing a unified administration approach to spectrum
217 policy. We need to keep the U.S. as anchor of innovation to
218 stay ahead of our global competitors. I really want to thank
219 the witnesses for being here today, and we can decide to dive
220 in for what will be a timely and productive conversation.
221 With that, I yield back the balance of my time.

222 [The prepared statement of Ms. Matsui follows:]

223

224 *****COMMITTEE INSERT*****

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225 *Mr. Latta. Thank you very much.

226 The gentlelady yields back, and at this time, the chair
227 will now recognize for five minutes the chair of the full
228 committee, the gentlelady from Washington.

229 *The Chair. Good morning, everyone. Thank you, Mr.
230 Chairman. Special welcome to the former chairman of this
231 committee, Mr. Walden, and it's great to have your portrait
232 on this side of the hearing room. Mm-hmm. Thank you to the
233 witnesses for providing your expertise today.

234 Today's hearing on Defending America's Wireless
235 Leadership will help inform the Energy and Commerce
236 Committee's work on spectrum policy, which is crucial to
237 maintaining U.S. economic and national security. For the
238 first time ever, the FCC's spectrum auction authority has
239 expired. On February 27th, the House passed bipartisan
240 legislation led by myself and Ranking Member Pallone to
241 extend the FCC's authority to issue spectrum licenses until
242 May 19th.

243 This would have given Congress enough time to come to an
244 agreement on a more comprehensive package addressing many
245 issues in the communications and technology space. For

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246 reasons unknown to me, certain senators decided to risk U.S.
247 wireless leadership over a date change, a date change. It is
248 unacceptable. We must come together and develop strong
249 spectrum policy here in the United States that is informed by
250 our values that support human flourishing and innovation.

251 We cannot afford to cede leadership to China and other
252 authoritarian countries who abuse their technology to
253 suppress freedom and assert command and control over people's
254 lives. I urge the Senate to act swiftly to pass H.R. 1108 to
255 extend the FCC's auction authority through May 19th so that
256 we can come together and pass a longer-term solution to this
257 issue. It's the Senate's only option on the table right now
258 to get us back on track.

259 Make no mistake. Getting this right will be key to
260 defending America's wireless leadership. For decades,
261 American policies rooted in promoting economic security and
262 competition have yielded breakthroughs in wireless
263 technology. Thirty years ago, Congress and the FCC pioneered
264 a bold new way to manage spectrum by auctioning spectrum
265 instead of giving it away through a lottery system.

266 This light-touch regulatory framework has brought

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267 billions of dollars into the U.S. Treasury through fierce
268 competition and ensured that entities who have a spectrum
269 license invest in technologies that utilize that spectrum as
270 efficiently as possible. This -- this approach has fostered
271 innovation in everything from faster broadband speeds,
272 precision agriculture, self-driving cars and vehicles and
273 smart manufacturing.

274 While the demand for commercial spectrum continues to
275 rise, so do the needs of our military, our border agents and
276 our researchers. In each new generation of technology, we
277 find innovative solutions to balance these needs and utilize
278 spectrum resources in a way that fits our nation's best
279 interest. Spectrum policy is crucial to our national
280 security policy. And we must stay true on the principles
281 that have enabled our success in wireless technology,
282 including by continuing to make spectrum available for
283 commercial use.

284 But our future economic competitiveness cannot rest on
285 our past success. The Chinese Communist Party and other
286 adversaries seek to undermine U.S. leadership, and they will
287 stop at nothing for their domination. China, Russia and

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288 other authoritarian countries have put forward a competing
289 vision for technology built on a foundation of surveillance
290 and control.

291 State-backed companies seek to write the rules of the
292 road that would use wireless technology to suppress free
293 speech, surveil their citizens and thwart the economic
294 competitiveness of the United States and our allies. Their
295 governments use top-down command-and-control policies to make
296 spectrum available on a moment's notice. They provide
297 prescriptive regulations and guidance to where and when
298 state-backed entities should deploy service. That is not how
299 the United States operates.

300 We believe in private-sector innovation. And spectrum
301 policy is at the heart of technological innovation. If we do
302 not take a leadership role in writing our wireless future,
303 China will. And writing our wireless future starts here at
304 home with comprehensive spectrum policy. I look forward to
305 today's hearing. It is extremely timely as we again remind
306 individuals in the Senate on the importance of America's
307 spectrum leadership. Thank you, and I would like to yield to
308 the lady from Florida.

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309 [The prepared statement of The Chair follows:]

310

311 *****COMMITTEE INSERT*****

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312 *Mrs. Cammack. Thank you, Chair Rodgers and Chairman
313 Latta. Just as a point of personal privilege, I would like
314 to recognize a very special guest today in the room with us.
315 Yesterday, she was at the White House receiving the
316 International Woman of Courage award. This is Brigadier
317 General Bolor. She is the first general of the Mongolian
318 Armed Forces. I met her several months ago. I met her
319 several months ago in Mongolia at one of our training
320 facilities, and she has been an inspiration not to her own
321 country but to women and girls all across the world. So
322 thank you so much for being here today, and thank you to the
323 chair and chairman for allowing me the -- a moment to
324 introduce her. Thank you.

325 *Mr. Latta. Well, thank you. And the gentlelady from
326 Washington yields back. At this time, the chair will now
327 recognize the gentleman from New Jersey, the ranking member
328 of the full committee, for five minutes.

329 *Mr. Pallone. Thank you, Chairman Latta. And it is
330 good to see Chairman Greg Walden here today. Good to see
331 you. Spectrum is one of our country's most underrated and
332 economically valuable natural resources. For the last three

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333 decades, Congress has given the FCC the authority to make
334 these airwaves available through the use of competitive
335 bidding or auctions. Granting the FCC this authority has
336 served both the public and the nation well. And today, the
337 U.S. is a global leader in delivering 5G, advanced Wi-Fi,
338 Bluetooth and other next-generation wireless technologies to
339 consumers across the country.

340 And at the same time, spectrum auctions, which have
341 raised over \$200 billion for the federal government, have
342 helped fund important public safety communications
343 priorities. Yesterday, for the first time, as my colleagues
344 have mentioned since the agency gained this authority 30
345 years ago, Congress failed to extend it when the Senate
346 refused to act. The Senate -- the House did its work. We
347 unanimously passed a bipartisan bill introduced by me and
348 Chair Rodgers last month to extend the spectrum auction
349 authority to May 19th.

350 Our legislation would have prevented this lapse in
351 authority. Now, I must say I am not -- I am often a critic
352 of the Senate. So I was not surprised that the Senate did
353 not pass the House's bipartisan bill. They have a basic

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354 problem passing any legislation. In case any of you didn't
355 know that, I'll reiterate it. But we cannot give up, and our
356 work continues. And that's why I'm pleased that we are here
357 today in a bipartisan fashion to shed some additional light
358 on how our airwaves benefit consumers on a daily basis and
359 keep Americans safe both here and abroad. Now, some
360 Americans may not know that wireless calls -- that wireless
361 calls travel over spectrum, as therefore the essential
362 building block for connecting family and friends, providing
363 access to emergency services during times of need and
364 delivering education and health services to Americans around
365 the country.

366 Without spectrum, we would not have wireless emergency
367 alerts, the app economy, smart phones, messaging services,
368 the internet of things, drones and so many other things.
369 Many of these technological advances were developed by
370 American innovators because the U.S. was on the cutting edge
371 pushing the limits of how spectrum could be used in new and
372 exciting ways. And these are remarkable achievements of
373 services people rely on every day.

374 But our country's past performance in aggressively

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375 deploying wireless technology does not guarantee future
376 success. Simply because our nation led the world in
377 providing consumers with access to 4G wireless technology and
378 Wi-Fi does not mean that we'll achieve the same result of 5G,
379 6G or Wi-Fi 7. And the stakes could not be higher.
380 Chairwoman Rodgers mentioned this. The failure to replenish
381 the commercial spectrum pipeline and extend the FCC auction
382 authority risks our nation falling behind our counterparts
383 across the globe, particularly China. And that's because,
384 you know, in producing cutting-edge consumer innovations and
385 enhancing our national security capabilities, we have to be
386 ahead of China.

387 Unlike the United States, the Chinese Communist Party
388 does not govern with the fundamental values of democracy,
389 free speech and human rights in mind. So time is of the
390 essence. We can't rest on past successes when China has
391 already reportedly made three times as much spectrum
392 available for 5G compared to the United States. Now, leading
393 the world in advanced wireless technology must also include
394 ensuring that these advancements are delivered equitably to
395 all Americans regardless of income or ZIP code.

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396 Unfortunately, too often, rural, tribal and low-income
397 areas are left behind as next-generation technologies are
398 deployed. And leaving these areas without these essential
399 services denies them the many benefits that these
400 technologies bring to others, including job and educational
401 opportunities, health services and so many other things that
402 we've all come to depend on.

403 Fortunately, programs like the Affordable Connectivity
404 Program that was established in the bipartisan infrastructure
405 law are helping connect these communities and the families
406 living in them. The affordable connectivity program has been
407 incredibly successful since it was rolled out, connecting
408 nearly 17 million families to high-quality and affordable
409 broadband. In fact, every single member on this subcommittee
410 on both sides of the aisle represents thousands of families
411 that are benefiting from this program today.

412 And this is especially important to highlight given that
413 low-income families are more likely to rely on a smart phone
414 and a mobile plan than a home broadband subscription. So I
415 look forward to hearing from our witnesses. Obviously, we
416 have a lot to do, and with that, I yield back, Mr. Chairman,

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417 the balance of my time.

418 [The prepared statement of Mr. Pallone follows:]

419

420 *****COMMITTEE INSERT*****

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421 *Mr. Latta. Well, thank you very much. The gentleman
422 yields back and that concludes our opening statements. We
423 have now -- we will now hear from our witnesses today. But
424 the chair would like to remind members that, pursuant to
425 committee rules, all members' opening statements will be made
426 part of the record. And again, thanks for coming to testify
427 before us today because, again, this is a day that you've
428 heard from several of us already how important it is,
429 especially with our spectrum auction authority.

430 Today's witnesses will have five minutes to provide an
431 opening statement, which will be followed by a round of
432 questions from our members. Our witness panel for today's
433 hearing will include Mr. Brad Gillen, executive vice
434 president with CTIA, The Wireless Association; Mr. James
435 Assay -- Assey, the executive vice president with NCTA, The
436 Internet Television Association; Dr. Monisha Ghosh, professor
437 at the University of Notre Dame College of Engineering and
438 former FCC chief technology officer; and Mr. Clete Johnson,
439 senior fellow at the Center for Strategic and International
440 Studies.

441 And at this time, we will start. And I'm also going to

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442 apologize about my allergies. As soon as they opened up that
443 plane door the other day, 10 minutes later, they are here.
444 But Mr. Gillen, you are recognized for five minutes. Thank
445 you very much for being with us.

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446 STATEMENT OF BRAD GILLEN, EXECUTIVE VICE PRESIDENT, CTIA -
447 THE WIRELESS ASSOCIATION; JAMES ASSEY, EXECUTIVE VICE
448 PRESIDENT, NCTA - THE INTERNET AND TELEVISION ASSOCIATION;
449 MONISHA GHOSH, PROFESSOR, UNIVERSITY OF NOTRE DAME; AND CLETE
450 JOHNSON, SENIOR FELLOW, CENTER FOR STRATEGIC AND
451 INTERNATIONAL STUDIES

452

453 STATEMENT OF BRAD GILLEN

454

455 *Mr. Gillen. Thank you, Mr. Chairman, Ranking Member
456 Matsui. And on behalf of the U.S. wireless industry, thank
457 you for having a hearing on our favorite topic, spectrum,
458 even if it is a bad day for spectrum policy. It was actually
459 50 years ago this year. A U.S. engineer walking down the
460 streets of New York made the first phone call with one of
461 these. We led the world in wireless that first day. We lead
462 today, and that is because of American ingenuity like that.
463 It is also because of American investment.

464 The wireless industry invested just \$35 billion just
465 last year, four years of record growth. That has benefited
466 Americans with 5G 1.5 times faster than we benefited from 4G

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467 a generation ago. The other key, as alluded to in the
468 opening statement, is this committee, your leadership.
469 Thirty years ago, you created the FCC spectrum auction as the
470 best way to allocate spectrum for commercial use. It has
471 been replicated around the world, even won the Nobel Prize.
472 We raised an astonishing \$233 billion for the U.S. Treasury.
473 It's helped drive everything we do from 2G to 3G, 4G to now
474 5G.

475 Now, spectrum policy gets way too wonky way too fast, as
476 that last sentence indicates. At its core, spectrum is the
477 fuel. It makes this go. And as a number of the opening
478 statements alluded to, it increasingly makes our economy go.
479 We are projecting over 4.5 million new jobs this decade
480 thanks to 5G innovation, from manufacturing to healthcare to
481 agriculture and more. It is also creating entire new
482 industries like 5G home, a new fixed broadband solution that
483 is bringing more choice and is bringing -- helping close the
484 digital divide.

485 The two fastest-growing home broadband solution
486 providers today are not fiber companies. They are actually
487 wireless companies. So that's the good news. It's actually

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488 the great news. We are really in a good place. The
489 challenge is we are almost out of fuel spectrum at exactly
490 the wrong time. You can see it is always easier with
491 pictures. On the first slide, you can see on the left-hand
492 side how much more data we used from the 2010 to 2021. It is
493 in the purple.

494 We used more and more each and every year. Where we are
495 now starting in 5G economy here, we are going to have growth
496 five times more over the next -- by 2027. That is a
497 staggering amount of growth. It indicates just how much more
498 we are going to use all these devices. And the challenge we
499 have as a nation is we do not have five times the amount of
500 spectrum to build that cliff.

501 In actuality, as the -- you have already identified, we
502 have zero more spectrum coming. And that really is the
503 challenge we face. There are no FCC spectrum auctions
504 planned today. And that is particularly important with
505 respect to something we call mid-band spectrum. FCC
506 Chairwoman Rosenworcel calls it the ideal blend of capacity
507 and coverage. It is. It goes far, and it carries a lot. It
508 is the key to what we need to do. The challenge is today our

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509 spectrum allocation, as you can see on the next slide, is not
510 in balance. When it comes to this key mid-band spectrum, we
511 have 12 times more of it assigned to government users. We
512 had seven more -- times more to our license and Wi-Fi
513 friends.

514 And we do that little blue dot that's assigned to 5G
515 today. We hope we can work with this committee to address
516 this imbalance because we see other countries doing that
517 right now. On the next slide, you can see what's happening
518 around the globe. Other countries are moving more quickly to
519 get 5G mid-band in folks' hands. And this is also part of
520 their -- they want to supplant U.S. leadership. Make no
521 mistake. They see what it meant -- is meant here, and they
522 want to replicate it back home where they are. Currently,
523 our deficit is over 300 megahertz. That is roughly two major
524 FCC auctions. And the hatch marks you can see by 2027, that
525 deficit will grow to over 500.

526 Absent corrective action, China has plans to
527 aggressively move forward and could have over 400 percent
528 more spectrum than available to the commercial sector in the
529 United States by 2027. Now, a number of the solutions of how

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530 we fix this, you have already alluded to. And that was great
531 to hear. The three things stand out in our minds. The first
532 is today is the first day in the last 30 years the FCC does
533 not have the basic tool to run auctions. That is an
534 unfortunate thing. We need to quickly -- and thank your
535 leadership for all you did to keep -- preserve that
536 leadership. We need to get the FCC the authority back.

537 And as key in doing that, the second piece is we need to
538 have a pipeline of auctions to go with it. The FCC needs
539 auctions to actually make this go. This committee in 1997
540 and 2006 -- in 2012, designated specific auctions along with
541 auction authority is critical to our success in the past and
542 can be so again.

543 Accenture has identified three bands that we believe are
544 prime candidates for future use. Welcome the chance to talk
545 about those today. And the third, it really goes to we need
546 better coordination. We need to empower the FCC and NTIA to
547 speak with one voice. They need to call balls and strikes
548 and be the experts that they are.

549 Too much of the challenges we have had the last few
550 years, we have been looking backwards, relitigating past

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551 disputes, not looking forward as to how all of these things
552 can push us forward, can help grow the economy, our economic
553 security, our national competitiveness and our national
554 security. There is very little things Congress can do other
555 than spectrum policy to really move this country forward. We
556 look forward to working with you and thank you for having us
557 today.

558 [The prepared statement of Mr. Gillen follows:]

559

560 *****COMMITTEE INSERT*****

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561 *Mr. Latta. Well, thank you very much, and Mr. Assey,
562 you are recognized for five minutes.
563

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564 STATEMENT OF JAMES ASSEY

565

566 *Mr. Assey. Thank you. Good morning, Chairman Latta,
567 Chairwoman Rodgers, Ranking Member Matsui and members. I'm
568 sorry. Ranking Member Pallone and members of the
569 subcommittee. My name is James Assey, and I am the executive
570 vice president of NCTA, The Internet and Television
571 Association. And thank you for the opportunity to testify
572 today on this important topic. You know, over the past
573 decade, the cable providers have invested over \$172 billion
574 to build, upgrade and extend fiber-rich networks all across
575 America that reach over 100 million homes today with gigabit
576 technology.

577 In the future, we will see that capability increase as
578 10G technology rolls out. But the reason I'm here is because
579 the wire really only tells part of the story. The
580 proliferation of internet-enabled devices, the consumer's
581 unyielding desire for data, has fueled cable's investment in
582 seamless connectivity. For over a decade, Comcast, Charter
583 and Cox have deployed millions of hotspots to deploy cable's
584 secure Wi-Fi service.

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585 Smaller cables like Midco are using wireless to extend
586 the reach of broadband in rural communities. And most
587 recently, cable providers are offering highly competitive
588 mobile services at attractive prices that deliver significant
589 savings to customers. Comcast and Charter, each with over 5
590 million subscribers, are the fastest growing retail wireless
591 companies in the marketplace. And Cox has just announced the
592 launch of its mobile service in January.

593 As this subcommittee considers how best to manage the
594 spectrum resources, I would like to just focus on three
595 points. First, demand is going to rise, and we have to rise
596 to meet that challenge. Faster broadband, more users, more
597 devices, a wealth of innovative applications will feed
598 consumers' endless appetite for data. Network investment and
599 technological innovation will help us meet those demands.

600 But promoting robust, seamless connectivity all the way
601 down to the device will also require renewed efforts to
602 support commercial use and balance the needs of government
603 users. Fortunately, Congress has long recognized the
604 importance of a spectrum pipeline. The FCC and NTIA play key
605 roles in identifying and studying new bands for commercial

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606 use. And NCTA strongly supports their continued coordination
607 to identify additional spectrum and develop new strategies.

608 Second, we have to have an all-of-the-above approach to
609 spectrum management that includes exclusive license, shared
610 license and unlicensed spectrum models. These models are
611 complementary. Exclusively licensed spectrum gives a single
612 entity the exclusive right to use certain frequencies. It is
613 used primarily by traditional wireless carriers with the
614 three largest carriers controlling 78 percent of all licensed
615 spectrum below 6 gigahertz. Shared license spectrum is an
616 innovative way to enable commercial use in federal spectrum
617 bands without moving incumbent government users. It was
618 adopted in the FCC's framework for commercial broadband radio
619 service and supports government use on a priority basis with
620 commercial use managed through dynamic sharing with licensees
621 and general users.

622 With 4.6 billion collected from the auction and over
623 285,000 base stations deployed, the CBRS approach
624 demonstrates how a shared spectrum model can bring new
625 spectrum online, attracting a diverse range of bidders to
626 usher in new competition and support new commercial uses

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627 while protecting critical government facilities. Finally,
628 unlicensed spectrum. For many, it is the internet in the
629 form of Wi-Fi.

630 It remains the engine behind many of today's most
631 popular consumer technologies. And it is the rock that
632 supports America's freedom to connect. The power and the
633 ubiquity of unlicensed technologies generates substantial
634 benefits to consumers and contributes well over a trillion
635 dollars annually to the U.S. economy. As new innovations in
636 Wi-Fi usher in better security, lower latency and
637 multi-gigabit speeds, it is critical we support America's
638 continued leadership and expansion in this space.

639 Finally, our wireless leadership will not be served by
640 an approach that puts all our eggs in one basket. We support
641 this committee's work in extending FCC's auction authority.
642 But the benefits of shared and unlicensed spectrum clearly
643 demonstrate that exclusive licensing can't be the sole focus
644 of spectrum policy. The most effective way to defend and
645 maintain America's wireless leadership will continue to be
646 through a balanced spectrum policy that addresses commercial
647 opportunities on a band-by-band basis and promotes ongoing

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648 competition and innovation. Thank you very much. Look
649 forward to your questions.

650 [The prepared statement of Mr. Assey follows:]

651

652 *****COMMITTEE INSERT*****

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653 *Mr. Latta. Well, thank you very much. And Dr. Ghosh,
654 you are recognized for five minutes.
655

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656 STATEMENT OF MONISHA GHOSH

657

658 *Dr. Ghosh. Good morning, Chairwoman Rodgers, Chairman
659 Latta, Ranking Member Matsui, Ranking Member Pallone and
660 members of the committee. Thank you for the opportunity to
661 testify today. My name is Monisha Ghosh, and I believe that
662 I can offer a balanced perspective on the matters before this
663 committee given my years of experience working in the
664 wireless industry, government, and academia.

665 I am currently a professor of electrical engineering at
666 the University of Notre Dame. I took two recent leaves of
667 absence to serve in government, first at the National Science
668 Foundation and then as the CTO of the FCC. I continue to be
669 actively engaged with both industry and government. I
670 co-chaired the FCC's Technological Advisory Council's working
671 group on advanced spectrum sharing in 2022. I am an active
672 member of industry's Next G Alliance, which is developing
673 standards for 6G, and the National Spectrum Consortium's
674 [inaudible] group where industry, academia, DoD and NTIA are
675 exploring efficient sharing solutions in 3.1 to 3.45
676 gigahertz.

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677 Finally, I am the policy outreach director for
678 SpectrumX, NSF's Center for Spectrum Innovation, led by Notre
679 Dame. A memorandum of agreement among the NSF, FCC and the
680 NTIA ensures that the research undertaken in SpectrumX can
681 directly impact policy. My testimony today will address
682 developing a sustainable spectrum strategy, bridging the
683 digital divide, and creating an entrepreneurial wireless
684 ecosystem.

685 A sustainable spectrum strategy is one that balances the
686 needs of commercial wireless, federal applications and
687 scientific uses while exploring all possible spectrum
688 allocation options. Exclusive licensing, shared usage and
689 unlicensed. It is increasingly difficult to relocate
690 incumbent users and, hence, sharing mechanisms must be
691 investigated for both unlicensed, as in 6 gigahertz and
692 licensed as in CBRS.

693 There is no one-size-fits-all solution. And sound
694 spectrum policy should be based on fundamental technical
695 analyses, measurements and testing, which includes all
696 relevant stakeholders. National institutes like SpectrumX,
697 NIST and ITS can perform this unbiased technical analysis

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698 that is required to determine the appropriate sharing
699 parameters and minimize the probability of interference and
700 maximize spectrum utilization.

701 We have current sharing schemes in the TV-wide spaces, 6
702 gigahertz and CBRS, which are based on database-mediated
703 sharing, which may not be suitable for all situations since
704 it is inherently less dynamic. We must consider newer
705 technical approaches to sharing such as exploiting the
706 spatial dimension offered by smart antenna arrays.
707 Furthermore, we need 6G and beyond standards to be sharing
708 native that is designed from the very beginning to operate in
709 shared frequency bands with incumbents instead of solely in
710 licensed or unlicensed bands.

711 Here, the U.S., with its rich history of
712 spectrum-sharing innovations in TV-wide spaces, 6 gigahertz,
713 and CBRS all led by the U.S. is well-positioned to be the
714 worldwide leader in standards development. Bridging the
715 digital divide will require attention to both availability
716 and affordability of broadband. Wireless back hall,
717 satellite connectivity, and private networks should all be
718 considered as potential solutions in both rural and urban

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719 communities.

720 Each may require additional spectrum to fuel their
721 growth -- growth trajectories, and the right mix will be
722 important. The availability of cost-effective spectrum will
723 allow smaller providers and communities to deploy and manage
724 their own wide area networks as bridging the digital divide.
725 The Wireless Institute at the University of Notre Dame
726 advised the city of South Bend to deploy a CBRS network that
727 provides an alternative connectivity option to a thousand
728 families who otherwise would not have access to similar
729 levels of connectivity at an affordable rate.

730 Newer devices required to access the latest networks are
731 often more expensive, hence efforts such as the affordable
732 connectivity program need to continue as well so that all
733 segments derive equal benefits from the latest technologies.
734 Finally, I would like to talk about creating an
735 entrepreneurial wireless ecosystem that can leverage
736 America's greatest strength, its start-up culture that
737 unfortunately is not currently as vibrant in the wireless
738 space.

739 Here, Congress must ensure that there are synergies that

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740 can leverage the CHIPS and Science Act to encourage
741 innovations in wireless chips. New applications areas for
742 wireless require new chips that do not necessarily have the
743 volumes required by mobile handsets but are an important and
744 growing component of the wireless ecosystem.

745 Disruptive applications in wireless are often harder to
746 bring to the marketplace due to lack of access to chips. In
747 conclusion, a spectrum strategy that considers all options,
748 enable sharing with incumbents, and creates spectrum
749 opportunities for emerging use cases will provide the best
750 climate for innovation to flourish in the wireless ecosystem.
751 Thank you for the opportunity to share my views, and I
752 welcome your questions.

753

754

755

756 [The prepared statement of Dr. Ghosh follows:]

757

758 *****COMMITTEE INSERT*****

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759 *Mr. Latta. Thank you. And Mr. Johnson, you are
760 recognized for five minutes.
761

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762 STATEMENT OF CLETE JOHNSON

763

764 *Mr. Johnson. Thank you so much, Mr. Chair, Ranking
765 Member Matsui, members. Really appreciate you having us here
766 today to discuss American leadership in wireless, which I
767 believe is a strategic imperative for the future of market
768 democracy. And I also have special gratitude for your
769 bipartisan approach. I think the most important and enduring
770 solutions come from bipartisan action. And I am glad that
771 two of our kids, Joe and Crosby, who are here today, get to
772 see the way the government is supposed to work. I will
773 explain the Senate to them later.

774 My own introduction to wireless communications was in
775 1998 when I was a 23-year-old Army lieutenant in Germany and
776 got a Nokia cell phone. Back then, 2G felt like science
777 fiction in real life. Those were really heady days for
778 Germany and Europe and market democracy. The Cold War was
779 won. Berlin Wall was down. Germany was reunified. Europe
780 was more stable and peaceful than any previous era of its
781 history.

782 NATO was bringing in new allies and keeping peace in the

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783 Balkans instead of preparing for war with the Soviets. In
784 the year 2000, Vladimir Putin was elected to lead -- was
785 elected -- important verb there -- elected to lead Russia,
786 and the U.S. and our allies put China on a path to join the
787 WTO. Serbian people overthrew Slobodan Milosevic, who is
788 thought to be Europe's last dictator. And the reunified
789 government of Germany moved back home from Bonn to Berlin.

790 Back then, we thought this all meant that market
791 democracy would win out once and for all over
792 authoritarianism, and the future would bring previously
793 unimaginable freedom, peace and prosperity. But a lot has
794 changed since then. China is now the most powerful
795 authoritarian state in world history. And with China's okay,
796 Russia launched the first war of conquest in Europe since
797 World War II.

798 Just before that invasion, President Xi and Putin
799 pledged a friendship without limits. The post-Cold War peace
800 is over. So now the security question of this century is
801 whether we and our market democratic allies can set the
802 world's course or if China and its supplicants will
803 predominate. That question underlies every other policy

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804 question that we face. Will the future be freedom and
805 innovation or surveillance and control?

806 I think the U.S. approach to 5G, the most secure
807 wireless technology ever, will be central to answering that
808 question. The ubiquitous connectivity driven largely by 5G
809 wireless broadband and the data, AI, advanced analytics that
810 will come with 5G will be a crucial domain for both
811 autocracies and market democracies. Mobile connectivity is
812 essential to modern society. And therefore, it must be
813 leveraged for dynamism and innovation. But the social
814 control and information operations from exploitation of this
815 technology is essential to China's autocratic ambitions. And
816 China seeks global influence through this power and control
817 of technology supply chains and information.

818 China has a plan that it is executing with the brutal
819 efficiency of a dictatorship. China is allocating spectrum
820 particularly mid-band full power spectrum crucial to 5G to
821 create an ecosystem for tech national champions like Huawei
822 that it can use to encircle the world with its so-called
823 Digital Silk Road. China sees an advantage in driving 5G
824 deployments into mid-band spectrum that are -- that's

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825 available commercially in China such as the lower 3 and 4
826 gigahertz bands.

827 It is crystal-clear that China has a plan for the
828 world's wireless future. What is our plan? We and our
829 allies are the greatest source of technological innovation
830 and economic vitality in human history. That is why we won
831 World War II and the Cold War. It is why we are presently
832 leading the global 5G economy. But we are hamstrung by
833 disputes between agencies that have slowed 5G deployments and
834 undermined the market certainty and investment that flows
835 from a robust spectrum pipeline.

836 And as many have noted, now we don't have authority to
837 auction more spectrum. We formed NATO to protect market
838 democracies after World War II. And now we must apply to
839 today's technology environment the same commitment to
840 principles of market dynamism, innovation, competition, and
841 democracy.

842 The world's future will be determined by whether the
843 U.S. model of market democracy can harness human ingenuity
844 and progress to prevail over restrictive authoritarians.
845 People inherently crave freedom and opportunity. Market

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846 diversity and competition is the beating heart of innovation.
847 And we need to leverage those ideals to our competitive
848 advantage. What that means is we need more spectrum for
849 commercial use. We need coherent government processes to
850 approve commercial deployments, and we need global
851 harmonization spectrum so the U.S. is not an island.

852 This is absolutely critical to our national security.
853 We get this right, we will ensure economic and technological
854 vibrancy that undergirds our overwhelming military strength
855 and edge in weaponry. And if we do that, we will lead the
856 world, the free world, in addressing the existential threat
857 from the autocratic exploitation of technology, thereby
858 securing the United States and our -- and our allies as
859 market democracies. Thank you, and I look forward to your
860 questions.

861

862 [The prepared statement of Mr. Johnson follows:]

863

864 *****COMMITTEE INSERT*****

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865 *Mr. Latta. Well, thank you very much. And that will
866 conclude our witnesses' opening statements. And at this
867 time, we will proceed with the members' questions, and they
868 will be -- will get five minutes. And, you know, I just want
869 to ask a quick question of everyone if you just answer yes or
870 no because, you know, you offered -- all been talking. You
871 have also talked about that -- in our spectrum authority
872 expired last night. We didn't -- you know, we try to get to
873 May the 19th, and we are not there. Can the United States
874 survive on short-time extensions of our auction authority?
875 Just yes or no. Can we?

876 *Mr. Gillen. No.

877 *Mr. Johnson. No.

878 *Mr. Latta. Let me ask this next question. You know,
879 through the years, I have served on this subcommittee. This
880 question has always come up, that the United States was
881 always leading in 5G. Is the United States leading in 5G
882 today, or are we behind?

883 *Mr. Gillen. We are leading today. With your help, we
884 can continue to lead.

885 *Dr. Ghosh. I think we are definitely leading.

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886 *Mr. Johnson. I think we are leading today because of
887 the innovators, and the government is holding us back.

888 *Mr. Latta. Well, thank you. Let me -- Mr. Gillen,
889 start with something you had said in your testimony. And I
890 think, again, it is important where we are today. In your
891 bullet points, you say we should create a schedule of future
892 spectrum -- of auctions. And, you know, one of the things,
893 of course, when you look at Huawei and the rip-and-replace --
894 and we already have 1.9 billion that was already given to the
895 FCC by Congress for the rip-and-replace. But, however, we
896 still need about 3.08 billion more dollars of fully funded.

897 When you -- when you see what Congress is doing, is that
898 what you said that we need to have a schedule of future
899 spectrum auctions?

900 *Mr. Gillen. I think yesterday showed we have a lot of
901 work to do together to get to that place, that we need the
902 FCC to have the tools to succeed. And I think there -- we
903 have bands available that we think could quickly get to
904 auction to fund other government priorities to help support
905 the treasury. But I think, most importantly, to really make
906 sure that 5G innovations are happening here.

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907 *Mr. Latta. Okay. Something -- again, when I was
908 reading the testimony last night, something I saw that caught
909 my eye -- and sometimes it's always by looking at verbs --
910 verb tenses. And Dr. Ghosh, you said that the U.S. was the
911 leader, recognizing that wide bandwidths were available in
912 the millimeter waves -- wavebands can be harnessed. You
913 know, are we falling behind? What's happening out there?
914 You say that we were. That's all -- and when I see those
915 past tense, it always scares me.

916 *Dr. Ghosh. No. I think the U.S. is actually still the
917 leader in millimeter-wave technology. The fundamental
918 research and initial development developing 5G millimeter
919 wave happened in the U.S. I still believe that the U.S. has
920 the maximum number of 5G deployments in millimeter wave.

921 *Mr. Latta. Thank you.

922 Mr. Johnson, also, when I was looking at -- reading your
923 -- going over your testimony last night. You know, you
924 mentioned that you're -- in your opening statement that, you
925 know, we need to have more spectrum available for commercial
926 use in the United States and that China has a plan that is
927 executing with brutal -- you say brutal efficiency of a

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928 dictatorship. China is allocating that spectrum,
929 particularly in the midband and how crucial it is to 5G.

930 Could you just -- you know, again, what's happening from
931 China to the United States kind of briefly, between the
932 United States and China when you're looking at those -- that
933 issue?

934 *Mr. Johnson. I think China has a -- as Chair McMorris
935 Rodgers laid out in her opening, China has a strategy and a
936 plan. The one benefit of an authoritarian regime is that
937 they can do exactly what they want on a minute -- on a
938 moment's notice. That has significant downsides in other
939 areas. But when you are trying to clear spectrum bands for
940 their purpose of taking over, essentially winning the 5G
941 leadership race, it means that they can target the lower
942 three and four bands and expect the rest of the world to
943 follow China's lead while the United States is an island and
944 is not deploying 5G in those bands. So it's a methodical and
945 strategic plan that they are executing. And they can because
946 they are a dictatorship.

947 Our system is a little more complicated. I think it
948 works a lot better over the long-term. But we need to have a

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949 plan that leverages our strength.

950 *Mr. Latta. Thank you. And Mr. Assey, I'm sorry. In
951 my last 30 seconds, you said something again. But also
952 reading your statement, we are looking at that. You said
953 about -- when you are looking at the unlicensed out there --
954 and that is the engine and the rock out there. And when you
955 look at our -- from the internet of things, the AVs and
956 everything else, you know, are we able to keep going to make
957 sure we maintain that level? And I'm sorry. I've only got
958 about 10 seconds left.

959 *Mr. Assey. No, thank you for the question. I think we
960 have always been the market leader when it comes to
961 unlicensed technology. The action that was taken by the FCC
962 in 6 gigahertz was the first unlicensed band that we had
963 opened up in a decade. And we are poised to extend that
964 leadership not just here but also around the globe. I think
965 there -- it is a point where we face a lot of opposition,
966 particularly from China, on a country-by-country basis that
967 sees America's continued leadership on unlicensed technology
968 as a threat. And I think it is an area where we can work to
969 try to counter that influence and continue what has been an

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970 incredibly important technology, not just for this country
971 but for the world.

972 *Mr. Latta. Well, thank you. And my time has expired.
973 And at this time, I'll recognize the gentlelady from
974 California, the ranking member of the subcommittee, for five
975 minutes.

976 *Ms. Matsui. Thank you, Mr. Chairman.

977 In both Congress and the executive branch, clear
978 delineations of jurisdiction help promote efficiency and
979 productive collaboration. I believe inconsistencies in these
980 jurisdictional lines is in part to blame for breakdowns in
981 spectrum governance.

982 Mr. Gillen, briefly, in your opinion, does mission creep
983 among federal agencies affect the federal government's
984 ability to speak with one voice on spectrum issues?

985 *Mr. Gillen. Thank you, Congresswoman. And I greatly
986 appreciate your leadership on this issue for a number of
987 years now. You have really been the one to call out that we
988 need to speak with one voice. And absolutely there has been
989 mission creep. We have too many voices trying to get
990 involved in spectrum discussions. We have expert agencies at

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991 the FCC and NTIA. We need to rely on them and let them make
992 their decisions. And too often right now, they are being
993 second-guessed.

994 And the sooner we get back to letting those experts do
995 their job, the better we are as a nation in terms of
996 addressing all the things Mr. Johnson said is happening
997 around the globe.

998 *Ms. Matsui. Okay. Thank you. I introduced the CHIPS
999 Act with Congressman Michael McCaul to reassert America's
1000 leadership in the semiconductor industry. Secretary Raimondo
1001 released the first notice of funding opportunity last week,
1002 and I'm excited about how this funding will boost advances in
1003 wireless communications.

1004 Professor Ghosh, can you describe how the CHIPS Act can
1005 encourage innovation and wireless chips and spectrum
1006 governance more broadly?

1007 *Dr. Ghosh. Thank you for that question. I strongly
1008 feel that even though we made great advances in 5G and
1009 unlicensed and the standards have actually helped
1010 tremendously, there comes a point where innovations become
1011 much harder to get into the marketplace because there is so

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1012 much of a standardization, you know, channel that -- has to
1013 go through. So with the lot of the new spectrum that is
1014 becoming available, you need new wireless chip sets.
1015 Sometimes the 5G can handle those. Sometimes they cannot.
1016 But what is happening today, I feel, is that the mobile
1017 consumer market is the dominating customer of wireless chips.
1018 And if something does not fit into that pipeline, it is much
1019 harder. And so you can see that in that there are very few
1020 wireless hardware startups.

1021 The many software startups because they don't face this
1022 issue. So I would really like to see how the CHIPS Act could
1023 encourage -- could create an ecosystem where these
1024 alternative wireless chips could be manufactured.

1025 *Ms. Matsui. That is great. We are hoping for that.
1026 Professor Ghosh, again, I have been working on draft
1027 legislation, which I hope to release soon, that would make
1028 important updates to the spectrum relocation fund. This fund
1029 helps federal agencies transition off spectrum to make it
1030 available for commercial use. I want to see this fund
1031 modernized to give agencies more flexibility and ensure they
1032 have the tools they need to meet their missions.

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1033 Professor, do you think additional incentives for
1034 federal agencies like upgraded technology could help free
1035 spectrum for commercial use?

1036 *Dr. Ghosh. Absolutely. I think one of the problems we
1037 face when we look at spectrum sharing is you are trying to
1038 share between legacy systems, which are sometimes decades-old
1039 with very new systems that are much more agile, can share
1040 better. And we always have to be backward-compatible. And
1041 so having funds that allow some of these legacy systems to
1042 upgrade or either relocate or even share better even if you
1043 wanted to share better with a co-, you know, allocce -- and -
1044 - that's a word -- in the band if you have better front ends
1045 and better filters that will allow you to do that better.

1046 *Ms. Matsui. Okay.

1047 *Dr. Ghosh. So I think we should explore all
1048 possibilities --

1049 *Ms. Matsui. Sure.

1050 *Dr. Ghosh. -- for doing this. Yes.

1051 *Ms. Matsui. Okay. Thank you. Mr. Johnson, can you
1052 discuss how spectrum harmonization informs geopolitical
1053 competition and what the U.S. can do to advance its interests

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1054 abroad?

1055 *Mr. Johnson. Absolutely. And I touched on this in the
1056 answer to Mr. Chair's question. Great question, ma'am. It
1057 -- it has to do with global scale. It is related to what Dr.
1058 Ghosh just said about putting -- putting chips and other
1059 components out that can reach global scale. If you have
1060 global harmonization of spectrum bands, then American and
1061 allied companies can compete. And often -- almost always in
1062 a fair competition, the U.S. and allied companies are going
1063 to win that competition.

1064 If they have the global scale, then they are not just
1065 selling to one market. They are selling to the world. And
1066 that is going to be crucial for the success of the CHIPS Act.
1067 We need to have global harmonization of these bands for that
1068 to materialize.

1069 *Ms. Matsui. Okay. Well, thank you very much, and I am
1070 running out of time. And Mr. Assey, I wanted to ask you
1071 about scoring, but I will ask that later. Thank you very
1072 much. I yield back.

1073 *Mr. Latta. Thank you. The gentlelady yields back, and
1074 what you are hearing is the votes are being called. What we

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1075 are going to do is I am going to run over and vote first and
1076 then our vice chair, our good friend from Georgia, is going
1077 to sit in the chair as is the vice chairman. I will run over
1078 and vote and come right back, and members are just coming
1079 back so we can keep the hearing going. Thank you. And at
1080 this time, the chair will recognize the gentlelady from
1081 Washington, the chairman of the full committee, for five
1082 minutes.

1083 *The Chair. Thank you, Mr. Chairman. The House
1084 recently passed our spectrum auction authority extension
1085 bill, the H.R. 1108, and it failed to pass the Senate. So
1086 now we have FCC's spectrum auction authority expiring for the
1087 first time in 30 years. So starting with Mr. Gillen, do you
1088 support this bill led by myself and Ranking Member Pallone to
1089 reauthorize spectrum auction authority until May 19th?

1090 *Mr. Gillen. Yes. It is critical the FCC has its tool
1091 back.

1092 *The Chair. Mr. Assey?

1093 *Mr. Assey. Yes.

1094 *The Chair. Thank you. Mr. --

1095 *Dr. Ghosh. Yes, yes.

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1096 *The Chair. Yes.

1097 *Dr. Ghosh. I think it's important for both exclusive
1098 licensing and shared.

1099 *The Chair. Thank you.

1100 *Mr. Johnson. Crucial to our national security.

1101 *The Chair. Thank you. Mister -- or Dr. Ghosh, I
1102 wanted to just follow up. You know, now we find ourselves
1103 needing to work quickly to reauthorize spectrum auction
1104 authority, improve interagency coordination on spectrum
1105 management actions and restore trust in the process. The
1106 NTIA and FCC are expert agencies when it comes to the
1107 management of spectrum decisions. The Infrastructure
1108 Investment and Jobs Act authorized the auction of the lower 3
1109 gigahertz band, provided uncertainty to the auction by
1110 requiring the Secretary of Defense to approve the auction
1111 moving forward.

1112 We need to restore the spectrum management process.
1113 NTIA must be at the helm in order to maximize efficient
1114 spectrum use. When decisions are made by expert agencies,
1115 they also need to be respected by all agencies and industry
1116 is final. So from a technical perspective, what can be done

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1117 to inject confidence back in this process?

1118 *Dr. Ghosh. I'm involved, as I mentioned in my
1119 testimony, in the discussions happening in part SS. And
1120 NTIA, FCC, and DoD are all in the room along with industry
1121 and academia. Spectrum decisions take time unfortunately.
1122 And what we are trying to work out in the committee is what
1123 is the most appropriate method. Is it shared licensing? Is
1124 it exclusive licensing? And the technical analyses are being
1125 done as a community.

1126 So I think that process is working. And I hope that at
1127 the end of the process, the lead agencies, which are NTIA and
1128 FCC, when it comes to spectrum matters, are the ones that
1129 will take final decisions about how they proceed in that
1130 particular band. But as I said, it is -- it is not an easy
1131 decision to say that we should or should not do one form of
1132 licensing versus another. There is a lot of technical input
1133 that needs --

1134 *The Chair. Thank you. Mr. Johnson, in your testimony,
1135 you argue that the central question to security in the 21st
1136 Century is whether the future will be one of freedom and
1137 innovation or surveillance and control. What are the risks

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1138 to the United States if we fail to reauthorize spectrum
1139 auction authority and create a stable, predictable
1140 environment for investing in wireless technology?

1141 *Mr. Johnson. Madam Chair, I think that if we don't --
1142 if we don't authorize more spectrum, more auction and,
1143 therefore, more spectrum, we will not lead in 5G. And if we
1144 don't need in 5G, it is very simple. China and its
1145 authoritarian supplicants will predominate in the 21st
1146 Century. That means an existential threat to market
1147 democracy, which means an existential threat to the United
1148 States because the future of technology is going to go in one
1149 of two ways, as you mentioned in your opening, freedom and
1150 innovation or surveillance and control.

1151 And these two things can't exist together. So it is a
1152 crucial matter of national security. And it really goes down
1153 to -- to weapon systems and military -- military strength as
1154 well. We can't win the future without winning 5G and AI and
1155 quantum and everything that goes along with that.

1156 *The Chair. Thank you. As a follow-up, you also note
1157 in your testimony that we need global harmonization of
1158 spectrum bands so that the United States is not on an island.

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1159 How would failing to reauthorize spectrum auction authority
1160 undermine the United States' efforts to lead on spectrum
1161 policy internationally?

1162 *Mr. Johnson. To give one example, in the lower three
1163 and lower four bands, China is seeking to harmonize the world
1164 without the United States. And it's -- if they do that, they
1165 are -- they are -- they will have a distinct advantage over
1166 the United States in 5G. I would never bet against us. We
1167 are the -- as I have mentioned before, we are the most
1168 innovative -- the biggest source of innovation and advances
1169 in world history. But if we are doing it without -- without
1170 us playing on the -- on the globally harmonized bands, we are
1171 doing it with a hand -- a hand tied behind our back or worse.

1172 *The Chair. Right. Thank you. And thank you all for
1173 being here. Very timely. Yield back.

1174 *Mr. Carter. [Presiding.] The gentlelady is yield --
1175 the chair now recognizes the ranking member from New Jersey,
1176 Mr. Pallone, for five minutes.

1177 *Mr. Pallone. Thank you, Chairman. Last week, the
1178 Energy and Commerce Committee advanced bipartisan legislation
1179 that overwhelmingly passed the House to extend the FCC's

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1180 auction authority, restore the role of the NTIA as the
1181 arbitrator of federal spectrum holdings, and use auction
1182 proceeds to pay for important public safety and national
1183 security programs and next-generation 911 and the Rip-and-
1184 Replace Program.

1185 More recently, the House unanimously passed a bill
1186 extending auction authority to give House and Senate
1187 negotiators more time to continue negotiating a package. In
1188 both cases, the Senate failed to act on these important
1189 bills. So today, we are in a new world where the authority
1190 is expired for the first time in three decades, creating
1191 doubt and uncertainty about America's governance over
1192 spectrum and the ability to continue to lead in wireless
1193 innovation. So Mr. Johnson, does this expiration have the
1194 potential to give China and other countries a leg up in their
1195 global campaign to dominate the world's wireless future? And
1196 in your opinion, is the continued presence of Huawei
1197 equipment in U.S. networks a national security threat? And I
1198 know you have already talked about this. But I would like to
1199 have more detail.

1200 *Mr. Johnson. I think the short answer is absolutely

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1201 yes on both counts. And happy to elaborate on either of
1202 those. But again, I think the -- on the question of Huawei,
1203 we need to have a future of trusted suppliers that are based
1204 in the United States and our allies, and therefore based in
1205 market democracies and operate under the rule of law. And
1206 the spectrum authority and the -- leading the future of 5G is
1207 crucial to that because China has a plan to do -- to go the
1208 other way and encircle the world with this Digital Silk Road
1209 led by Huawei and other national champions like ZTE and
1210 others.

1211 *Mr. Pallone. Thank you. And obviously we are going to
1212 continue to work on a bipartisan basis here in the House and
1213 try to get the Senate to do something. Mr. Gillen and Mr.
1214 Assey, can you both talk about how your members and, in turn,
1215 the American public will benefit from the stability of a
1216 long-term pipeline of spectrum and FCC auction authority?
1217 I'll start, I guess, with Mr. Gillen.

1218 *Mr. Gillen. Thank you, Congressman. Absolutely. The
1219 key for so much of the development we want with 5G jobs, with
1220 innovations around manufacturing and healthcare come back to
1221 do we have the spectrum to actually support these

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1222 functionalities. And so we are really excited about what 5G
1223 can be. And the key to making that go is additional spectrum
1224 auctions and the certainty this committee can uniquely
1225 provide.

1226 *Mr. Pallone. Mr. Assey?

1227 *Mr. Assey. I think it goes to what I said in my
1228 testimony. The demand for data just continues to grow and
1229 grow. And we need all available technologies to be able to
1230 provide the type of seamless connectivity from providers all
1231 the way down not just to the household but to the device in
1232 the consumer's hand. We have a great opportunity to do that.
1233 But we need to be able to work on a balanced strategy that
1234 will unlock new spectrum for commercial us.

1235 *Mr. Pallone. All right. Well, let me get to my last
1236 question. As you know, I mentioned in my opening statement
1237 that most Americans rely on their wireless devices daily
1238 without even thinking about it. And as we consider how to
1239 ensure there is a spectrum available for all these uses, we
1240 have to ensure that certain communities are not left out of
1241 the incredible opportunities that wireless innovation will
1242 bring.

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1243 In the short time that's been in place, the Affordable
1244 Connectivity Program has helped nearly 17 million Americans
1245 afford broadband and ensure that the networks fueled by all
1246 this spectrum are put to good use in communities across the
1247 country. So on that note, again, Mr. Gillen, Mr. Assey, do
1248 you agree that this program has been successful in connecting
1249 people all over the country who might not otherwise be able
1250 to afford internet service? You have got about 30 seconds
1251 each.

1252 *Mr. Gillen. It's been incredibly helpful. And as you
1253 alluded to in your opening, we are very proud that wireless
1254 is the on-ramp to the internet for millions of low-income
1255 Americans. We are proud that 55 percent of Americans are
1256 electing mobile solutions when taking advantage of this
1257 program. You see great work, countries -- Navajo Nation,
1258 Cellular One connecting 40,000 that weren't connected before,
1259 expanding that access. So we are greatly appreciative of how
1260 that program is bringing more people online.

1261 *Mr. Pallone. I appreciate you mentioning Indian
1262 country too because it's so important to them. Mr. Assey?

1263 *Mr. Assey. Yes, we obviously are actively engaged in

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1264 the ACP program and believe very strongly in broadband
1265 adoption. It is important not only to the consumers and the
1266 families that are on the program. But it is also important
1267 related to the work that this committee and this Congress has
1268 done in providing funding to build new infrastructure and to
1269 reach the unconnected because those people are going to need
1270 to be online as well, and it is important that we follow
1271 through that program.

1272 *Mr. Pallone. All right. Thank you so much. Thank
1273 you, Mr. Chairman.

1274 *Mr. Carter. The gentleman's --

1275 *Mr. Pallone. Good to see you in the chair.

1276 *Mr. Carter. The gentleman's time has expired. Chair
1277 recognizes the gentleman from Florida, Mr. Bilirakis, for
1278 five minutes.

1279 *Mr. Bilirakis. Thank you, Mr. Chairman. I appreciate
1280 it very much, and I do hope that the Senate is watching this
1281 particular hearing. Before today, we have never seen a
1282 spectrum auction authorization lapse before. It has been
1283 said several times. And there are a lot of questions about
1284 the extent of the disruption. It goes without saying that

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1285 the FCC would not have authority to start new proceedings for
1286 new auctions. But my question for Mr. Gillen is, in your
1287 opinion, sir, would the FCC still have authority to process
1288 auctions that have already taken place to allow auction
1289 winners to receive the rights to the spectrum bands they have
1290 already paid for?

1291 *Mr. Gillen. Thank you for the question. And as you
1292 noted, this is an unprecedented day. We haven't been in this
1293 place in 30 years. So I think, unfortunately, the answer is
1294 we don't know. There is a lot of uncertainty in industry.
1295 There is a lot of uncertainty at the FCC as to what the FCC
1296 can and can't do right now. This has been a critical tool in
1297 how they operate. It provides 25 percent of the funding for
1298 the agency. So the sooner we get the certainty back and we
1299 start moving forward, we can get those questions asked. The
1300 spectrum you alluded to, the spectrum that has been purchased
1301 and can be benefiting Americans today if was in the hands of
1302 the licensee. And so those are some of the challenges that
1303 we have today that we have never had before.

1304 *Mr. Bilirakis. Thank you. As a follow-up, Mr. Gillen,
1305 if it is ultimately determined the FCC did not have authority

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1306 to process completed auctions, how does this impact private
1307 bidding in future auctions and the government's ability to
1308 earn top dollar when licensing future bands when that
1309 authority is reinstated?

1310 *Mr. Gillen. It is a great question. Uncertainty is
1311 not -- does not drive capital. So the more certainty we have
1312 that the FCC is going to have the authority to do the
1313 auctions, to license the spectrum -- and also, a part of what
1314 this committee is really key is the certainty when those
1315 auctions are coming, what is coming next and actually have a
1316 schedule and a plan. And so that is not just giving the FCC
1317 the tool. It is also setting a schedule going forward as
1318 critical if we want to keep up with what's going around the
1319 world, if we want to meet the demand of American consumers.
1320 We just need that certainty and actually need the plan of how
1321 we are going to get the spectrum out in a way over the next
1322 few years that is meaningful.

1323 *Mr. Bilirakis. Thank you, sir.

1324 Mr. Assey, spectrum auctions are one of the few things
1325 the federal government does that actually raises money. I am
1326 particularly interested in ensuring that Americans get the

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1327 most from industry for these finite resources. The benefits
1328 are clear when exclusively licensed spectrum is auctioned off
1329 for revenues. But can you articulate how the American
1330 taxpayer benefits from shared licensed and unlicensed
1331 spectrum usages?

1332 *Mr. Assey. Thank you for the question. You know, I
1333 think if you go back to 1993, that is when auction authority
1334 really started. And you have to look at it as one arrow in
1335 the quiver, a tool that the government can use. And for that
1336 time, we had a very strange process for assigning rights in
1337 spectrum, which was we had a lottery or we had comparative
1338 hearings. This was a mechanism for distributing the rights.
1339 But it is -- there is no question that when you hold an
1340 auction, revenues are created when you distribute those
1341 rights. But that is a byproduct, not an end in and of
1342 itself. And I think one of the things that you have to look
1343 at is not just kind of the short-term upfront revenue that
1344 comes in but all the revenue that is created by the
1345 innovation that is unlocked when spectrum is made available
1346 for commercial use. You know, we talked about the unlicensed
1347 economy contributing over a trillion dollars annually to the

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1348 U.S. economy.

1349 That is of great economic benefit. It is of great
1350 economic benefit to let a thousand flowers bloom, to have
1351 more competitors in a marketplace and to have a robust
1352 ecosystem that can support the development of equipment.
1353 That is what will make us successful for the long-term.

1354 *Mr. Bilirakis. I appreciate it very much, and I want
1355 to thank all of you for your testimony. Very informative. I
1356 yield back the balance of my time, Mr. Chairman.

1357 *Mr. Latta. [Presiding.] Thank you very much. The
1358 gentleman yields back, and the chair now recognizes the
1359 gentlelady from New York for five minutes.

1360 *Ms. Clarke. Good morning, and let me start by first
1361 thanking our panel of witnesses for joining us today as well
1362 as Chairman Latta and Ranking Member Matsui for convening
1363 this hearing on America's wireless leadership at such an
1364 important time with the recent lapse in the FCC's spectrum
1365 auction authority. I am proud of this committee's previous
1366 work to advance thoughtful legislation around spectrum
1367 auctions and urge our Senate colleagues to do your job. I
1368 mean, what is the problem? Follow the House's lead and pass

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1369 legislation extending this critical authority.

1370 The wireless industry plays a vital role in our
1371 increasingly digital society. Innovation in a desperate -- a
1372 disparate array of industries, including healthcare,
1373 agriculture, autonomous vehicles, gaming, manufacturing, and
1374 more is powered by connectivity. As policymakers, it is our
1375 responsibility to ensure that long-time industry stakeholders
1376 and new market entrants alike have access to the resources
1377 and information necessary to maintain competitiveness
1378 globally and provide Americans with high-quality service.

1379 My first question is intended for Mr. Gillen, but any of
1380 our witnesses are welcome to respond as well. Mr. Gillen,
1381 given the wireless usage trends in the U.S., can you speak to
1382 the consequences from an industry perspective of continued
1383 inaction on spectrum auction authority?

1384 *Mr. Gillen. Thank you, Congresswoman. You are exactly
1385 right. This uncertainty is going to have a direct impact on
1386 American consumers. We expect five times more growth between
1387 now and 2027. Our ability to meet that growth will be called
1388 into question if we don't get more spectrum. I think the
1389 bigger risk, as Mr. Johnson has alluded to, is you risk

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1390 ceding our leadership and things going forward to China and
1391 other countries that are providing spectrum resources more
1392 quickly. And so it is really critical both from our global
1393 competitiveness but also just creating more jobs with 5G
1394 economy that we need to get going now.

1395 *Ms. Clarke. Would anyone else like to respond to that?
1396 Dr. Ghosh?

1397 *Dr. Ghosh. Yes. I would like to just support that
1398 statement and also point out that when we talk about auction
1399 authority, it is not just for exclusive licensing. So even
1400 if we go down the route of shared spectrum, CBRS was
1401 auctioned and licensed. So it is -- we need the licensed
1402 authority so that the FCC can -- can investigate all these
1403 different ways of spectrum sharing, whether it's exclusive or
1404 not.

1405 *Mr. Assey. I would agree with that. And I would just
1406 underscore that, you know, auction authority is a very useful
1407 tool in the toolbox. But the real end here is can we unlock
1408 more commercial spectrum. Can we develop new strategies that
1409 will allow us to share spectrum, to make more intensive use
1410 of spectrum, to become more efficient because that is really

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1411 the only way that we are going to meet the demand for
1412 commercial services but also be respectful and responsive to
1413 the needs of government users.

1414 *Ms. Clarke. Mr. Johnson, would you just comment on the
1415 global dynamic?

1416 *Mr. Johnson. It is commercial spectrum and more
1417 commercial spectrum is indispensable to our economic and
1418 technological vitality in the -- in the core center of the
1419 future of the economy and security. If we don't have it, we
1420 can't compete. And therefore, we can't win the future. I
1421 mean, we won World War II because we were the arsenal of
1422 democracy. We won the Cold War because market democracy
1423 works a lot better than the system that the Soviets had in
1424 place. You can just look at West Germany and East Germany
1425 and it is the economy and technology that makes a difference.
1426 If we don't have spectrum, we are fundamentally hamstrung.

1427 *Ms. Clarke. Thank you. As cochair of the Smart Cities
1428 Caucus, I want to ensure that we are leveraging next
1429 generation technologies to improve lives and enable better
1430 living conditions for all. Even major cities like New York
1431 face unique challenges that are best addressed through

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1432 technological advances like the internet of things and access
1433 to high speed affordable Wi-Fi. Mr. Assey, can you discuss
1434 the uses of unlicensed spectrum and other advances in
1435 technology that have the potential to power smart cities?
1436 And other panelists are welcome to chime in as well.

1437 *Mr. Assey. Yes, Congresswoman. There is no question
1438 that when we talk about seamless connectivity, we are talking
1439 about taking that fiber-rich network that has been built over
1440 the past decades and really just going beyond those
1441 boundaries and creating connectivity that is ubiquitously
1442 available to all. That can be via unlicensed spectrum. That
1443 can be via CBRS spectrum. That can be via 5G spectrum. But
1444 I think it's an immensely powerful position that we are going
1445 to be in to promote partnerships between providers and cities
1446 to deal with things like traffic management, to deal with
1447 things like sensor networks that will allow it to manage
1448 lights, to deal with venues and public information.

1449 This is a great, positive step forward. It is a
1450 wonderful set of services that is being developed. We are
1451 seeing evidence in the CBRS space. Cox Communications is
1452 partnering in Las Vegas to do just this, and we expect more

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1453 of it in the future.

1454 *Ms. Clarke. And I thank you for your response, and I
1455 have to yield back. Thank you, Mr. Chairman.

1456 *Mr. Latta. Thank you very much. The gentlelady yields
1457 back. The chair now recognizes the gentleman from Michigan's
1458 Fifth District for five minutes.

1459 *Mr. Walberg. Thank you, Mr. Chairman, and thank you to
1460 the witnesses for being here today. This Congress I have had
1461 the honor to serve as a cochair of both the 5G Caucus and the
1462 Rural Broadband Caucus. The road to connection for all
1463 Americans will be paved by a number of technologies,
1464 wireless, Wi-Fi, fiber, satellites. But our country's full
1465 connectivity potential cannot be realized without
1466 establishing a coordinated and robust spectrum pipeline. And
1467 to that, we all agree. To that end, Mr. Gillen, Mr. Assey,
1468 what are the most underutilized frequencies by commercial or
1469 federal users? And secondly, where should Congress focus its
1470 efforts on a spectrum pipeline bill?

1471 *Mr. Gillen. Thank you, Congressman. Thanks for your
1472 leadership on the caucus as well. We think the focus needs
1473 to be on mid-band spectrum. It is what is being used around

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1474 the world. I think there is imbalance today right now in
1475 terms of the government has 12 times more control than
1476 available for 5G in the mid-band. In terms of specific
1477 bands, the lower 3, 4 and 7 gigahertz, we think there are
1478 opportunities for -- win-win opportunities for agencies. Dr.
1479 Ghosh alluded to a lot of the agencies are using not the most
1480 efficient systems in the world. Through auctions, we can
1481 help upgrade those systems and create better outcomes. So
1482 there is a lot of spectrum in those bands, and we think there
1483 is opportunities for both commercial and government success.

1484 *Mr. Assey. I would agree that the 3 gigahertz band is
1485 an opportunity for us to unlock new spectrum. I think it is
1486 going to require sharing techniques that are going to allow
1487 us to be able to use for commercial use while respecting the
1488 needs of government users. I also think the 7 gigahertz band
1489 is an area where we could see that work that we did in 6
1490 gigahertz, opening it up for unlicensed, extended and pave
1491 the way for the next generation of unlicensed Wi-Fi
1492 technology, Wi-Fi 7.

1493 *Mr. Walberg. Mr. Johnson, as I said earlier, I am
1494 cochair of the 5G and Beyond Caucus. My fellow cochairs

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1495 recently reintroduced H.R. 1377, the Promoting U.S. Wireless
1496 Leadership Act, which would advance U.S. wireless
1497 competitiveness by directing the NTIA to promote U.S.
1498 participation and leadership in communication
1499 standard-setting bodies. Participation in these
1500 international groups -- at least I believe it is critical for
1501 our country to remain the wireless leader. If China is
1502 successful in setting spectrum policy and moving the rest of
1503 the world in a different direction than the United States,
1504 does that mean Chinese network gear like Huawei and ZTE will
1505 be the standard going forward? And secondly, what does that
1506 mean for the security of us and our allies?

1507 *Mr. Johnson. Thank you, Mr. Walberg. That is a great
1508 question. To answer -- to take both -- both parts of the
1509 question, on the standards processes, U.S. and allied
1510 innovators have long set the standard -- literally set the
1511 standards in 3GPP and in other international standards
1512 bodies. China is trying to take kind of a government-centric
1513 approach to shape those standards processes. I think there
1514 has been a lot of talk about lots of Chinese entities like
1515 Huawei and ZTE sort of flooding the zone in these standards

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1516 processes.

1517 That is a -- it is a concern. But the innovation and
1518 the technical aspects of standard-setting takes place with
1519 the best ideas and the best innovations. So, so long as we
1520 are at the -- we and our allies are at the -- and those --
1521 those companies that are based in market democracies are at
1522 the table, I feel confident that they will set -- literally
1523 set the standards in the future. We just need to make sure
1524 that they are there and they're a whole host of policy ideas
1525 that can make -- help make that happen.

1526 On the second part of your question about Huawei and ZTE
1527 and other tech national champions from -- based in China, the
1528 reason that they have a strategic objective to deploy the
1529 Digital Silk Road, as they put it, is because if the world is
1530 wired with gear and companies that are based in the People's
1531 Republic of China, the People's Republic of China can control
1532 those networks. It is really that simple. It is not about
1533 backdoors or, you know, is there some sort of, you know,
1534 espionage capability. Yes, there is, I think. But the real
1535 issue is control. You can think about it like Russia's gas
1536 pipelines.

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1537 If they control the flow of gas to Europe, then they
1538 have got a strategic power over Europe. Same thing. That is
1539 why we don't want to have China and Huawei wiring the entire
1540 world.

1541 *Mr. Walberg. Well, I appreciate that. More could be
1542 asked, but right now I guess we appeal for a functioning
1543 Senate. You can understand the challenges and at least help
1544 us start to get back on track. So thank you. I yield back.

1545 *Mr. Latta. The gentleman yields back. The gentleman
1546 from Florida is recognized for five minutes.

1547 *Mr. Soto. Thank you, Chairman. 5G is now beaming
1548 across much of the nation. I know how much work it took for
1549 a lot of you in this room as well as our partners at the FCC
1550 and the Congress and the infrastructural laws extending
1551 high-speed internet to rural areas, including in South
1552 Osceola County, where I represent. These spectrum auctions
1553 have fueled economic growth, advances in technology and
1554 communications and key revenue for critical programs. The
1555 spectrum is critical for faster downloads for Central
1556 Floridians for all Americans, for better connectivity for
1557 devices, advances in artificial intelligence, virtual

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1558 reality, multiplayer gaming, commercial uses in commercial
1559 space, tourism, simulation and training, so many areas that
1560 we back home care deeply about.

1561 And we did our part in the House by extending the
1562 spectrum auction authority last week, yet the Senate let it
1563 lapse due to concerns by the U.S. Department of Defense. We
1564 obviously all want a strong defense of the homeland. But I
1565 would note that, until recently, this -- these auctions have
1566 been a holy civilian process by the FCC. So I wanted to
1567 start by getting a sense from all of you. First, we'll start
1568 with Mr. Gillen. How well has the civilian process worked,
1569 and do you know of any security threats that arose from the
1570 process? Like has DoD reached out to you about that because
1571 a lot of this is just coming to a head now.

1572 *Mr. Gillen. Thank you for the question, Congressman.
1573 And the FCC process works really well as long as there is
1574 access to spectrum to sell. And the challenge we have now is
1575 12 times more of this critical asset is being controlled by
1576 the government and is available to commercial use. So the
1577 only source really of spectrum right now is government users.

1578 And I think we have replicated, in this committee's

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1579 leadership, with AWS-3 auction and the 3.45 auction that we
1580 create opportunities, that we actually strengthen the mission
1581 that a lot of the equipment that our military and agencies
1582 are using needs to be upgraded, needs -- can be used spectrum
1583 more efficiently and auction proceeds can go do that. So we
1584 tend to think, when engineers start talking about these on a
1585 system-by-system basis, there are wins-wins. We can increase
1586 our warfighting capabilities and deliver advanced services to
1587 your constituents.

1588 *Mr. Soto. Thanks. And Mr. Assey, how do you feel the
1589 civilian process has worked? And do you know of any security
1590 threats that arose from the civilian process to date? Has
1591 DoD reached out to the association or your clients about it,
1592 or what is your belief on those things?

1593 *Mr. Assey. I mean, I think the process is -- I won't
1594 say necessarily messy, but it is probably reflective of the
1595 fact that we have a lot of users and a lot of complicated,
1596 important national security interests to try to work through.
1597 Dr. Ghosh referred to the Path SS process that began over a
1598 year ago. My industry, Mr. Gillen's industry and others are
1599 participating with DoD and NTIA and others and trying to work

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1600 through that process. But it is -- it is extremely
1601 difficult, and we have some real challenges. There was a
1602 report today that, you know, it might take as long as 20
1603 years and \$120 billion to vacate that band.

1604 So, you know, we are going to have to really try to rely
1605 on the experts like Dr. Ghosh who have the technical
1606 expertise to try to deal with this issue and really do our
1607 best to figure out how we can make spectrum available.

1608 *Mr. Soto. And we are going to pivot to Dr. Ghosh now.
1609 Can we do both?

1610 *Dr. Ghosh. Yes, I believe we can. I think if vacating
1611 becomes impossible, we have to look at better ways of
1612 sharing. And just to address your question about, you know,
1613 has DoD reached out. Have they complained? Let's take the
1614 example of CBRS. There have been 250,000 CBSDs deployed. As
1615 far as we know, there has never been any complaint of
1616 interference from the DoD. So clearly sharing can work.
1617 Sharing can work to protect the incumbent, which is the DoD.
1618 It can also work in places like South Bend where now you
1619 have, you know, 7 terabytes of data being transferred over
1620 CBRS to low-income families, which you wouldn't have been

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1621 able to do if that spectrum had been locked away.

1622 So we have to investigate how we can best use spectrum.

1623 I would encourage, you know, people not to take sides, that

1624 it has to be auctioned and licensed. There are many, many

1625 innovative ways that we can think about sharing spectrum,

1626 *Mr. Soto. Mr. Chair, I would urge that we hold tight

1627 to our jurisdiction, not let this get away from us. This

1628 needs to remain a civilian process. And I would encourage us

1629 to have DoD be more plain about some of their concerns, that

1630 we can resolve this.

1631 *Mr. Latta. Thank you very much. And the gentleman's

1632 time has expired.

1633 The chair now recognizes the vice chair of the

1634 subcommittee, the gentleman from Georgia, for five minutes.

1635 *Mr. Carter. Thank you, Mr. Chairman, and thank you for

1636 scheduling this meeting. The timing is obviously impeccable.

1637 Incredibly timely hearing. And as all of you have pointed

1638 out, Americans are very dependent on reliable connectivity.

1639 And we all understand that. And thank you for being here,

1640 and thank you for -- for emphasizing that. And it's our job

1641 on this committee, in particular, to ensure that the agencies

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1642 that are tasked with this responsibility of managing the
1643 spectrum have the resources that they -- they need to be
1644 successful. And I'm -- I'm just -- just looking forward to
1645 continuing on that task for this committee.

1646 Dr. Ghosh, I'll start with you. Obviously, as an
1647 engineer and a researcher, not unexpectedly, you have
1648 highlighted the importance of making the spectrum decisions
1649 informed by unbiased and technical analysis. In fact, I will
1650 share with you -- and I am running the risk of being a little
1651 self-serving here. But just two days ago, this subcommittee
1652 voted to advance my legislation, the -- to codify the
1653 Institute for Telecommunication Sciences, which you note in
1654 your testimony plays a crucial role in making spectrum
1655 available for commercial use. And I want to ask you what
1656 role do you think this laboratory will play in America's
1657 ability to stay ahead of international competitors like China
1658 on spectrum -- spectrum policy?

1659 *Dr. Ghosh. I think ideas, along with other institutes
1660 like NIST and SpectrumX have a huge role to play here. They
1661 have the expertise to actually do testing. Oftentimes, these
1662 sharing mechanisms on these systems are designed with very

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1663 accurate simulations and analyses. But the real world,
1664 especially when you talk about RF signal propagation, there
1665 is not -- you know, follow those analyses very carefully. So
1666 we do have to have processes in place where we have a way --
1667 platforms that can actually deploy and test some of these
1668 really complicated systems that we are developing.

1669 *Mr. Carter. Great.

1670 *Dr. Ghosh. So I would definitely encourage, you know,
1671 that ITS be central to these discussions as well as other
1672 research labs across the country, the universities and other
1673 places.

1674 *Mr. Carter. Good. Well, thank you. Thank you. And
1675 thank all of you for making the point of how important this
1676 is for our -- for our competition with China because I think
1677 one of the greatest threats to our country is just that, is
1678 China, and the threat that they -- that exists there. And
1679 all of you have made that quite clear during this hearing
1680 today, and I appreciate that. I am a healthcare
1681 professional, a pharmacist, the oldest pharmacist in
1682 Congress, by the way.

1683 And you know, I have made it one of my top priorities to

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1684 make sure that we are competitive in the pharmacy world and
1685 the pharmaceuticals with China. And we need to be
1686 competitive here as well. There is no question about that in
1687 the wireless space. But the consequences are great.

1688 Mr. Gillen, I'll ask you. For decades, Congress has
1689 designated NTIA to manage federal agency use of spectrum.
1690 When it comes to extending auction authority and making more
1691 spectrum available for commercial use, why is it important to
1692 have one agency in charge of speaking for the executive
1693 branch?

1694 *Mr. Gillen. It is critical that we can't have agencies
1695 fighting amongst each other. These are technical things, as
1696 Dr. Ghosh has alluded to, and we need to let the experts make
1697 those hard calls and to decide the interference rights and
1698 then commercialize the spectrum. And once that auction is
1699 sold, we need those that bought the spectrum be able to use
1700 it to start delivering services as quickly as possible.

1701 *Mr. Carter. So what would it look like if we had -- if
1702 -- if each agency managed their own spectrum use?

1703 *Mr. Gillen. I think we could all go home. We would be
1704 in a --

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1705 *Mr. Carter. Yeah, exactly. No question about it. And
1706 thank you for making that point. Mr. Assey, I will ask you
1707 this. Two recent auctions of federal spectrum for commercial
1708 use are in the CBRS band in the 3.45 to 3.55 gigahertz band.
1709 These two spectrum bands both involve spectrum sharing. But
1710 each band approaches the issue slightly differently. Could
1711 you please discuss the opportunities and challenges that are
1712 presented by each of these type of approaches?

1713 *Mr. Assey. The CBRS auction, I can talk about.

1714 *Mr. Carter. Okay.

1715 *Mr. Assey. Sure. I think the benefit of the CBRS
1716 auction was that we were able to get all manner of people to
1717 participate in that auction. We had not just traditional
1718 players. We had cable companies. We had schools. We had
1719 John Deere and manufacturers. We have the Port of Long
1720 Beach. So we are able to get many more people into the
1721 system to be able to bid on spectrum, to be able to use the
1722 spectrum and complete in providing services. And we are now
1723 starting to reap the benefits of that.

1724 Dr. Ghosh talked about the base stations that have been
1725 rolled out and the very many different innovative ways in

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1726 which the spectrum is being put to use, including by wireless
1727 carriers. So I think that is an example of how we can have
1728 an auction but also recognize the share -- the needs of
1729 government users and be able to share spectrum efficiency but
1730 unlock it for commercial use. If we didn't have that type of
1731 an arrangement, we might be at the same stalemate, and we
1732 miss the opportunity --

1733 *Mr. Carter. Right.

1734 *Mr. Assey. -- to get more spectrum in --

1735 *Mr. Carter. Well, I appreciate that. I am about out
1736 of time. Mr. Gillen, you want to add something?

1737 *Mr. Gillen. Just real quick. And I do think -- we
1738 look at sharing solutions. We also have to look at the
1739 opportunities lost and that sharing brings low power,
1740 particularly the complex sharing we are talking about. If
1741 you want to build out to rural America, it is one-seventh the
1742 power. It is a lot more time to get to more communities. It
1743 is also preemptable.

1744 So if you want to build a secure, reliable service to
1745 know that the government can come in and say you can't use
1746 that anymore, it makes it harder to do things we're trying to

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1747 do vis-a-vis China and driving these forward.

1748 *Mr. Carter. Good, good. And I am out of time, but I
1749 would be remiss if I didn't recognize the fact that Mr.
1750 Johnson is from the state of Georgia. This is extremely
1751 important to our state. So thank you for being here, and
1752 thank you for participating.

1753 *Mr. Latta. Well, thank you very much.

1754 *Mr. Carter. Thank you, Mr. Chairman. I will yield
1755 back.

1756 *Mr. Latta. Thank you very much. The gentleman's time
1757 has expired. And the chair will recognize now his friend,
1758 the gentlelady from California's 16th District, for five
1759 minutes.

1760 *Ms. Eshoo. Thank you, Mr. Chairman. You have really
1761 been studious about getting the number of my district correct
1762 so proud of you and thank you. I am the veteran of hundreds
1763 of congressional hearings. I want to compliment all the
1764 witnesses today because I think you have made this a highly
1765 instructive one, so thank you. Mr. Johnson, as -- you have
1766 made several references to Huawei and I have been on Huawei
1767 for at least a decade, maybe a decade and a half. And I

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1768 think that -- that the pressure that was brought to bear --
1769 first of all, placing a spotlight on them or not even a
1770 handful were appreciating what Huawei was doing. But I think
1771 the tackle and blocking and the cooperation of the FCC and
1772 what they put into place on a bipartisan basis, I am quite
1773 pleased about.

1774 So to Mr. Assey, I want to go back to this -- the CBRS
1775 and, you know, what that represents. In your written
1776 testimony, you discuss the -- you know, the deployment of
1777 shared license spectrum to enable obviously commercial use in
1778 federal spectrum bands -- you also -- bands. You also
1779 discuss the FCC's commercial broadband radio service. [A
1780 cell phone rings.] I don't have time to shut that off. Can
1781 you build on what you have already shared with us, why you
1782 believe it is so effective and what the FCC should be doing
1783 to evaluate when considering expanding it.

1784 And then I want to go to Mr. Gillen because in your
1785 written testimony, you showed skepticism of shared spectrum,
1786 particularly CBRS and why you think -- why do you think
1787 Congress and the FCC should be skeptical of it? So away we
1788 go.

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1789 *Mr. Assey. I think it is an important model. And as I
1790 said, what we are going to need in order to succeed, in order
1791 to compete with China, is a balanced approach that really
1792 allows us to use every tool in the toolbox to make commercial
1793 spectrum available. When we have situations that will not
1794 allow for clearing or that will not allow for us to do that
1795 in a timely way, we are basically leaving on the table the
1796 ability to get spectrum out there and used by thousands of
1797 innovators who could use it to build systems and ports, to
1798 build networks and schools.

1799 So there is a real benefit to bringing spectrum online
1800 as quickly as we can. We obviously need the technologist to
1801 basically evaluate these bands. They are getting more
1802 crowded. There are lots of competing uses out there. But I
1803 think it is a wonderful testament to the ability of our
1804 country to innovate and figuring out ways where we can meet
1805 the needs of government users, critical government-used needs
1806 but also unlock spectrum that can be put to use quickly and
1807 by lots of new competitors to the marketplace.

1808 *Ms. Eshoo. But is this kind of a tug-of-war between
1809 different businesses?

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1810 *Mr. Assey. Well, just to follow up, I mean, it is a --

1811 *Ms. Eshoo. And I want to get to Mister --

1812 *Mr. Assey. Yeah.

1813 *Ms. Eshoo. -- Gillen.

1814 *Mr. Assey. Sure. I mean, I -- look. I think what we
1815 are going to have to do is go on a band-by-band basis and
1816 determine which approach is the best -- is going to best meet
1817 consumer needs.

1818 *Ms. Eshoo. Mr. Gillen?

1819 *Mr. Gillen. Thank you for the question. And I think
1820 everything Mr. Assey said is right. This is a valuable
1821 experiment, but it is still very much an experiment. The
1822 first in the world to do it. Roughly there are lots of good
1823 use cases out there, but it is also less than 5 percent of
1824 that spectrum is getting used today. We think we have that
1825 sandbox for innovation right now. The places that we need
1826 more attention right now is full power spectrum that is
1827 licensed. That is where we are really falling behind now.

1828 *Ms. Eshoo. I see.

1829 *Mr. Gillen. So I think, in our minds, we have the
1830 experiment. Let's focus on things that are full power.

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1831 Let's focus on things that we know work as we let that
1832 experiment continue to develop.

1833 *Ms. Eshoo. Thank you very much. I yield back.

1834 *Mr. Latta. Thank you very much. The gentlelady yields
1835 back, and the gentleman from Florida is recognized for five
1836 minutes.

1837 *Mr. Dunn. Thank you very much, Mr. Chairman. And I
1838 want to say thank you, too, to an unusually talented panel
1839 that we have gathered today in front of us. So it is very
1840 incumbent on us in Congress to pave a path forward for
1841 American commercial enterprise to compete with China's rapid
1842 technological development. As most of us know, China's
1843 Digital Silk Road and technologies like Huawei are quickly
1844 acquiring the building blocks for 5G and digital dominance.
1845 There is a lot of talk all through Congress on the Select
1846 China Committee where I sit and elsewhere, basically
1847 everywhere, about the dangers of TikTok, which is important.
1848 However, if China wins 5G and develops a software that rides
1849 on top of next-generation networks, I worry that the Chinese
1850 Communist Party will leverage that innovation against the
1851 entire free world, all sectors, energy, healthcare,

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1852 transportation, AI, everything.

1853 So I think this is the real risk if we don't make more
1854 spectrum available for commercial use. Every person in this
1855 room should be concerned about CCP dominance of 5G technology
1856 and what that means for national security and the future
1857 generations to come in America.

1858 My esteemed colleagues on this committee enjoy a
1859 bipartisan, pro-American approach to technological
1860 innovation, which is fundamental in finding a solution to
1861 this interagency debate and political disputes. You know,
1862 that -- these things are standing in the way, honestly, in
1863 the way of America's global competitiveness. I look forward
1864 to finding a real solution that clears both chambers of
1865 Congress at this urgent time. With that said, Mr. Johnson,
1866 you mentioned in your testimony positive developments in
1867 global competitiveness for spectrum use include one more
1868 spectrum and two coherent government processes for improving
1869 commercial use. Let me say I agree that leveraging American
1870 free markets is a key development to a path forward. We
1871 hear, however, about China making large amounts of spectrum
1872 available through raw government command and control. Should

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1873 we be following them down the path to making the same
1874 frequencies available, or should we just -- can we rely on
1875 the market forces to determine what spectrum best serves
1876 American interests?

1877 *Mr. Johnson. Thank you, Congressman. It is a very
1878 important question. And also want to commend you for
1879 focusing in on the CCP. When I say China, talking about the
1880 Chinese Communist Party, not the Chinese people.

1881 *Mr. Dunn. We are sensitive about that on the China
1882 Select --

1883 *Mr. Johnson. It is absolutely -- it is absolutely
1884 crucial. The Chinese civilization is one of the great
1885 civilizations in history. Chinese-Americans are going to be
1886 a crucial and very important part of our country's future.
1887 But this is about the system of government run by the Chinese
1888 Communist Party, as you note. And the short answer to your
1889 question about should we do it their way, absolutely not.
1890 What we should do is have a coherent process that, when a
1891 decision is made, as I'm -- fellow witnesses have said, that
1892 the decision sticks and that the U.S. government process
1893 which is collaborative, which is multiagency, when it -- when

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1894 it arrives at a decision, that the decision is final, and we
1895 get to deploy in C-band, for instance, and not have a delay.
1896 That -- and as for the global harmonization, I certainly
1897 should -- we should not be following China's lead. We should
1898 be leading in the harmonization. And, you know, that happens
1899 in a variety of places. We have got some incredible public
1900 servants who are going to be doing that. Anna Gomez at the
1901 State Department. America needs to be leading. But in order
1902 to lead, we have to have spectrum available in order to lead
1903 the harmonization.

1904 *Mr. Dunn. Thank you for making that clear. I want to
1905 make sure that, you know, we were on the same page here. Mr.
1906 Gillen, the mid-band spectrum deficit in the U.S. is -- was
1907 facing, you outlined in your testimony really is concerning.
1908 We are told now, by 2027, China is going to have four times
1909 as much 5G spectrum as we'll have. Can you explain how China
1910 is using spectrum policy to get ahead and what the risk is to
1911 the United States economically and to national security in 30
1912 seconds?

1913 *Mr. Gillen. Absolutely. No problem. It is two-fold.
1914 One is that they want the innovations that we have led in 4G.

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1915 They want those innovations that happened there. They
1916 understand that spectrum superiority comes with technical
1917 superiority. So from a straight softwares perspective, they
1918 want robotics -- and everything rides on these networks -- to
1919 happened there first. I think it was all Mr. Johnson said.
1920 This is also -- in terms of mid-band access, there are global
1921 bands being built around the world. We are absent from a lot
1922 of those conversations today. We need this committee to
1923 jumpstart us and get us into those discussions because, right
1924 now, we are ceding those conversations to China. We are
1925 ceding those conversations to the rest of the world.

1926 *Mr. Dunn. Thank you very much. It was very succinct.
1927 I think our technology will be untrustworthy if we let China
1928 lead. Thank you, Mr. Chair. I yield back.

1929 *Mr. Latta. Well, thank you very much. The gentleman
1930 yields back the -- his time. And at this time, the gentleman
1931 from Texas's 33rd District is recognized for five minutes.

1932 *Mr. Veasey. Mr. Chairman, thank you very much.

1933 Mr. Gillen, in your testimony, you talked a little bit
1934 about the Affordable Connectivity Program. I was hoping that
1935 you could expand on that a little bit and talk about the

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1936 importance of that program and being able to connect some of
1937 these families. I think that 55 percent of Americans under
1938 the Affordable Connectivity Program now have access to
1939 reliable high-speed internet, how important and
1940 transformational that is for our country.

1941 *Mr. Gillen. It is so critical. Everything we are
1942 talking about today is about the connectivity that will
1943 empower, improve education, improve healthcare outcomes. It
1944 all depends upon people actually being connected. And so ACP
1945 has been critical to get millions of Americans to stay on
1946 broadband and also millions to get on broadband. We are very
1947 proud that 55 percent of Americans are picking wireless
1948 solutions. We have always been the on-ramp for the internet
1949 for millions of Americans. We think it is something that is
1950 very important. And so we very much appreciate the program's
1951 focus on making sure that all Americans benefit from the
1952 conversation we are having today.

1953 *Mr. Veasey. Thank you very much. I was also hoping
1954 that if you could elaborate on a different topic. But the
1955 tangible benefits that Americans are receiving because the
1956 FCC has -- have the authority to conduct auctions in awarding

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1957 spectrum.

1958 *Mr. Gillen. The most recent one that it brings to mind
1959 is 5G Home because having more spectrum that has more
1960 capabilities allowed us to now enter the home broadband
1961 market. And that creates more competition. We have 90
1962 percent of new home broadband ads were wireless companies
1963 this last year. It also is a great tool to help close the
1964 digital divide. Too many kids still outside McDonald's doing
1965 homework still today despite a lot of good work. Fixed
1966 wireless is a solution that can help address that really
1967 quickly. And so that solution is as good as the spectrum we
1968 have. And the more spectrum we have, the more robust that
1969 can go. And the more full-power spectrum we have, the
1970 further into rural America we can deploy that asset.

1971 *Mr. Veasey. No, absolutely. And I know that the FCC's
1972 auction authority expired last night. But hopefully they
1973 will get that fixed over in the Senate soon and extend that.
1974 As Congress looks to a longer-term extension, how important
1975 is it going to be for us to create a pipeline of spectrum,
1976 and how will this help in reducing the current deficit the
1977 U.S. is facing in making mid-band spectrum available for

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1978 commercial use as compared to our competitors around the
1979 globe?

1980 *Mr. Gillen. It's central. Only this committee can do
1981 this. We have seen -- each time you have extended auction
1982 authority for long-term, 2012 is the last good example.
1983 Because of that, the FCC had something to auction. We can't
1984 just give the FCC auction authority and then not have
1985 anything for them to sell. And it is critical for this
1986 committee to identify those particular bands, particularly
1987 mid-bands that can go far, can carry a lot, that is happened
1988 -- being used around the world. And really this committee is
1989 uniquely situated to not only -- as you guys have worked
1990 really hard to preserve auction authority but also make sure
1991 that we have a plan going forward to deliver on the promise
1992 that we are talking about.

1993 *Mr. Veasey. No. Thank you very much. Dr. Ghosh, I
1994 wanted to ask you -- you know, really appreciate all the work
1995 that you are doing to bring together researchers and staff
1996 from universities, including minority-serving universities at
1997 SpectrumX. And I was hoping that you could tell us, based on
1998 your research and experience working in the wireless field

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1999 what workforce developments are needed to further aid
2000 America's leadership in spectrum policy and wireless
2001 technologies?

2002 *Dr. Ghosh. Thank you for that question. Workforce
2003 development is a core activity within our center. And we are
2004 taking it down to even the middle school and the high school
2005 levels. We need to get kids excited about not just running
2006 apps on their phones but what makes phones work. And we are
2007 doing that through a number of initiatives. We are creating
2008 course content within the center that will -- can be used by
2009 high school teachers to educate kids in high school. We are
2010 creating course content that can be used in community
2011 colleges, in four-year colleges, that can be used to educate
2012 people about spectrum. Spectrum is one of those interesting
2013 things where there is not one course that you can take that
2014 makes an expert on spectrum.

2015 It -- you need to know about physics propagation. You
2016 need to know about electrical engineering. You need to know
2017 about software, and bringing all of those competencies
2018 together is very, very important. Within SpectrumX, we just
2019 kicked off an initiative last week, actually, among four of

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2020 the MSIs. We are going to have undergraduate students walk
2021 around with phones and collect spectrum data, collect signal
2022 strengths, look at what the throughputs are so that they get
2023 an understanding of these networks that they depend on, how
2024 they actually perform in the real world. We feel that is
2025 extremely important activity that centers like SpectrumX can
2026 do.

2027 *Mr. Veasey. Yeah, well, thank you very much. And you
2028 also mentioned affordable -- program in your testimony. And
2029 I really appreciate that. I just can't -- I don't think that
2030 we can emphasize that enough. So thank you. Mr. Chairman, I
2031 yield back the few seconds I have. Thank you.

2032 *Mr. Latta. Thank you very much. The gentleman yields
2033 back, and the chair now recognizes the gentleman from Utah
2034 for five minutes.

2035 *Mr. Curtis. Thank you, Mr. Chairman. Mr. Gillen and
2036 Mr. Johnson, you started off the hearing with your graph, Mr.
2037 Gillen, of data usage. And, Mr. Johnson, your 2G phone
2038 reminded me of my party line when I was young. Tonight you
2039 can go home and explain to your children what a party line --
2040 it was not a party, but we literally shared a line with our

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2041 neighbors and made me think of my first laptop computer. And
2042 I was proud today that I upgraded it from 32K to 64K. It was
2043 a RadioShack TRS 80 and certainly highlights the challenge --
2044 right? -- that's ahead of us. I'd like to just briefly
2045 highlight something everybody in this room knows about the
2046 Spectrum Innovation Act and remind us that the bill made
2047 lower 3 gigahertz band available so that we could improve our
2048 5G network and be competitive. It also tied together auction
2049 authority with funding for next gen 911 and Rip-and-Replace
2050 and so that we can take the Chinese telecom equipment out of
2051 U.S. networks and replace them with clean and safe equipment.
2052 These programs, I think we should know, were funded with
2053 zero taxpayer dollars. It is pretty significant and without
2054 adding to our deficit. Unfortunately, as we have discussed
2055 today, the legislation didn't pass the Senate. The auction
2056 authority just lapsed, and we have still not fully funded
2057 Rip-and-Replace. The delay is costing providers in my state
2058 and putting the coverage in rural areas in my district at
2059 great risk. We all talk about beating China, winning the 5G
2060 race and beyond and securing the communication
2061 infrastructures. But when it really came down to it,

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2062 Congress dropped the ball on this.

2063 Let me start with you, Mr. Gillen. One of the issues we
2064 are dealing with is making sure that small carriers have
2065 resources necessarily to remove and replace Huawei and ZTE
2066 from their networks. I understand we have over \$3 billion
2067 shortfall. And if not fully funded by July, these carriers
2068 will have to make very difficult decisions about securing
2069 their networks. Can you help us understand the urgency for
2070 fully funding Rip-and-Replace programs and why July is an
2071 important date?

2072 *Mr. Gillen. Thank you, Congressman. This has been a
2073 priority of the committee for a long time. And you guys
2074 brought the focus on this from a national security
2075 perspective. We are greatly appreciative. Greatly
2076 appreciative.

2077 *Mr. Curtis. Could you pull your microphone --

2078 *Mr. Gillen. Sorry.

2079 *Mr. Curtis. There. Thank you.

2080 *Mr. Gillen. The challenge we have, as you alluded to,
2081 we can do a lot of good things with auction proceeds. And we
2082 just need more auctions on the books. And I think whether

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2083 it's FirstNet that's helped first responders, there is lots
2084 of things that you guys decide what ultimately the auction
2085 revenues do. We need that spectrum, and we are happy to
2086 contribute. It is over \$233 billion to the Treasury. And
2087 there is lots of good congressional priorities that that
2088 money can get used to --

2089 *Mr. Curtis. Could you just briefly restate why the
2090 lapse in auction authority hinders U.S. leadership?

2091 *Mr. Gillen. Yes, sir. Absolutely. It is -- when we
2092 look at what is happening -- not having the ability to have a
2093 plan -- a set of auctions going forward is really
2094 challenging. It is really problematic. We see our rivals
2095 moving forward with haste. They have a plan, and they are
2096 executing on it. And I think the concern Mr. Johnson said
2097 about us becoming an island is real, particularly when it
2098 comes to mid-band access. And that goes really far. It
2099 travels far. It is key to what we want to do to make sure
2100 this benefits all Americans. And so the faster we get
2101 mid-band in the hands of innovators, the better things we can
2102 do for all consumers.

2103 *Mr. Curtis. Thank you.

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2104 Mr. Johnson, good luck explaining a party line to your
2105 kids. But for a minute, you know, the irony here is, you
2106 know, some of the protection of spectrum is for national
2107 security. But can you explain if we don't let go of that,
2108 why it hinders national security?

2109 *Mr. Johnson. Thank you, Congressman. I think that
2110 might be the most important question here. And Department of
2111 Defense -- I was born on an Air Force Base, Army veteran.
2112 Love the Department of Defense. The weapon systems and the
2113 services that the Department of Defense and its arm -- and
2114 its uniformed services provide are obviously the best in the
2115 world, crucial to our national security, crucial to world
2116 peace, crucial to every aspect of what we do. That includes
2117 some of the capabilities that they -- that are enabled by
2118 their present spectrum holdings. Related to that and
2119 underlying that is the economic strength and vitality of the
2120 United States and our allies. If we don't have that -- and
2121 again, I think to look at -- look at the difference between
2122 the southern part of Korea and the northern part of Korea.
2123 The western part of former Germany, the eastern part. It is
2124 economic vitality and technology is what -- is what provides

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2125 us the ability to win strategic competitions and to win wars
2126 when necessary.

2127 *Mr. Curtis. Thank you. I'm --

2128 *Mr. Johnson. So it is absolutely crucial. I don't
2129 have -- I don't presume to have the answer for how you -- how
2130 you -- how exactly technically we go. We have to find a way
2131 for that spectrum to be for commercial use.

2132 *Mr. Curtis. Thank you. Unfortunately, I am out of
2133 time. I would just like to quickly add my voice to the many
2134 compliments to all of you today for being here with us. And
2135 Mr. Chairman, I yield back.

2136 *Mr. Latta. Well, thank you very much. The gentleman
2137 yields back. The chair now recognizes the gentleman from
2138 California for five minutes.

2139 *Mr. Cardenas. Thank you, Chairman Latta and also
2140 Ranking Member Matsui for having this very, very important
2141 hearing, albeit probably pretty boring to most of the people
2142 in America. And hopefully we have at least seven listeners
2143 today live, hearing this important discussion. And I would
2144 like to thank the witnesses for coming forth with your
2145 opinions and your expertise as well and for all the work that

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2146 you've done. Some of you have been in the private sector for
2147 some time. Some of you in the universities and also in the
2148 public sector as well. So thank you so much for all that
2149 you've given to our country and to the progress and process
2150 that we are talking about today.

2151 We are talking about wireless networks and technologies
2152 that play an incredible role in everyone's life in America,
2153 yet at the same time, Americans take it for granted. What we
2154 don't do here -- what I hope and pray that we don't do in
2155 Congress is take it for granted that everything is going to
2156 be just fine. We just saw the expiration happen because the
2157 lack of cooperation between two bodies, the House of
2158 Representatives and the United States Senate.

2159 Hopefully we can get that straightened out soon on
2160 behalf of the American people so we can continue to progress.
2161 We are not alone in this world. We talked a lot about China.
2162 And China isn't the only player on the planet but certainly a
2163 very dominant player. But yet again, we have heard, by
2164 testimony, that, yes, we have confirmed that the United
2165 States still is the dominant player, but we are not alone.
2166 And we could fall back, and falling back is not good for

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2167 security. It is not good for the American people. It is not
2168 good for the economy. It is just not good. So with that,
2169 what I would like to do is start off with a question to Dr.
2170 Ghosh. In your testimony, you speak about how spectrum
2171 policy can help bridge the digital divide. In particular,
2172 you said spectrum policy that makes available cost-effective
2173 spectrum to small providers and communities to deploy and
2174 manage their own wide-area networks can be very effective in
2175 bridging the digital divide in both urban and rural
2176 communities. Could you tell us more about what the FCC has
2177 done to ensure that smaller providers in local communities
2178 can access the spectrum and provide better service to lower
2179 income and underserved communities like mine in the San
2180 Fernando Valley?

2181 *Dr. Ghosh. Thank you for that question. So the most
2182 recent example of what the FCC has done is through CBRS. By
2183 creating 150 megahertz of spectrum in the mid-bands that can
2184 be available either through licensing or even through
2185 unlicensed through GAA licensees, you are allowing
2186 communities to deploy their own networks, which is exactly
2187 what South Bend has done on their city schools. So we talked

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2188 a lot about exclusively licensed. We talked a lot about
2189 unlicensed. I think we need to explore the space between the
2190 two because there are a lot of applications that are not
2191 well-served by either very well. And shared spectrum, more
2192 of that that's available, I know you mentioned the high
2193 power. High power is great if you want a nation-wide
2194 footprint. But a lot of these applications -- you have a
2195 rural community. You just want to get -- get their citizens
2196 covered. Low power is fine for those applications.

2197 And just another concluding remark on that is that in
2198 rural areas specifically, it is not a shortage of spectrum
2199 that is creating the digital divide. It is a shortage of
2200 infrastructure. And the reason there is a shortage of
2201 infrastructure is cost. So we have to balance how much
2202 spectrum we have and how do we make sure that infrastructure
2203 actually rolls out to the places where it is needed.

2204 *Mr. Cardenas. And it can be done. And it can be done.
2205 Thank you. As you know, Dr. Assey, data tells us that
2206 certain communities such as Hispanic communities over-index
2207 on the use of mobile devices for their primary or sole
2208 connection to the internet. Mobile wireless competition in

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2209 these communities is, therefore, absolutely critical. If any
2210 one provider dominates the marketplace, these communities get
2211 the short end of the stick. It is important to me that our
2212 spectrum policy in this country keeps this in mind. And we
2213 prioritize intense mobile wireless competition.

2214 How, in your view, does shared license spectrum support
2215 mobile wireless competition that might benefit communities
2216 that rely heavily on mobile wireless access to the internet?

2217 *Mr. Assey. Again, I think it goes back to what Dr.
2218 Ghosh was saying. It is bringing more providers into the
2219 marketplace and the CBRS auction we had over 250 people who
2220 claimed licenses. That was 10 times what we had seen in
2221 prior auctions. But, you know, the real -- the real acid
2222 test, I think, is in the mobile space. We are seeing Comcast
2223 and Charter grow. We are seeing them build out that
2224 connectivity all around cities and towns. And consumers are
2225 benefiting. They are able to provide very attractive rates
2226 and savings.

2227 And the other thing I think that's really important too
2228 is -- and it is the reason that we need the balanced approach
2229 is because when you are using this device in your home,

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2230 Comcast has 80 percent of the data that is going over here is
2231 going over Wi-Fi. It is not going over a licensed network.
2232 So we need to make sure that we make commercial spectrum
2233 available through all means possible.

2234 *Mr. Cardenas. Once again, I think public-private
2235 partnerships are key in that effort of connectivity. Thank
2236 you, Mr. Chairman. I'm sorry I went over my time.

2237 *Mr. Latta. The gentleman yields back, and the chair
2238 now -- pardon me -- recognizes the gentleman from
2239 Pennsylvania for five minutes.

2240 *Mr. Joyce. Thank you, Chairman Latta. Spectrum plays
2241 a vital role in connecting Americans, especially those
2242 residing in rural areas like I represent in southwestern and
2243 south-central Pennsylvania. It ensures that they have the
2244 necessary broadband access to work, to farm, to heal, to do
2245 their commerce, to learn from home, all which are a vital
2246 component of the world that we live in today, which is why
2247 the federal government must work together to establish an
2248 intergovernmental approach to ensure that all parties
2249 involved are on the same page when it comes to spectrum
2250 policy by having that whole-of-government approach. It sends

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2251 that clear message to stakeholders that, in the United
2252 States, we want to continue to be the leading innovator. It
2253 also shows the rest of the world to look to us in America
2254 when it comes to all things spectrum.

2255 Mr. Assey, can you talk on how having a balanced
2256 spectrum policy benefits the constituents in a rural
2257 congressional district like I serve in Pennsylvania?

2258 *Mr. Assey. Absolutely. Obviously, having the
2259 availability of unlicensed spectrum is very important. It
2260 basically extends the reach of the wired networks that we
2261 we've built out and will extend the capabilities that your
2262 consumers are going to be able to use when they are
2263 subscribing to cable service. But it also -- these new
2264 models, the innovative models like CBRS, are allowing us to
2265 take government spectrum that was previously locked away and
2266 unlock it and allow a host of different types of
2267 manufacturers or towns or schools to be able to build out
2268 networks and systems. So I think it is one of these areas
2269 where the more we make available to America's innovative
2270 spirit, the more we will be able to produce.

2271 *Mr. Joyce. So are you paralleling the ability to have

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2272 that access to spectrum with the ability of Americans to be
2273 the innovators, to be the entrepreneurs that we need?

2274 *Mr. Assey. Absolutely. There is a reason the U-NII 3
2275 band was called the innovation band, because it unlocked all
2276 manner of ideas and technologies that we could only dream of.
2277 We hope to replicate that.

2278 *Mr. Joyce. I would like to continue with Mr. Gillen.
2279 So recognizing that we are talking about rural areas that are
2280 grossly underserved, how do we go home to these areas that
2281 are unserved or underserved and talk particularly as a
2282 representative from the Commonwealth of Pennsylvania? How do
2283 we assure them that they are going to have the services that
2284 they see in Pittsburgh and in Philadelphia?

2285 *Mr. Gillen. It is a great question, and it is a
2286 critical priority. All the things that we are talking about
2287 need to be available to all Americans. And I think when we
2288 talk about a balanced policy, I share Mr. Assey's goal. We
2289 need the government to have enough spectrum. We need
2290 unlicensed to have enough spectrum. We need licensed to have
2291 enough spectrum. And right now, unfortunately, we are in
2292 balance. Unlicensed has seven times more than we do.

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2293 Government has 12 times more. So that is why we are just
2294 focused on the full-power license that we are seeing around
2295 the world being used. And for us, it is between a full power
2296 and a CBRS solution. The difference in power is seven times
2297 over. Our ability to get to more and more communities
2298 quickly is all tied to that power level. And that is why it
2299 is so important when we have these conversations. We want to
2300 get quicker to more communities. A lot of that conversation
2301 gets to -- Dr. Ghosh is exactly right. It gets to
2302 infrastructure. But how much infrastructure you need goes to
2303 how strong that signal can go.

2304 *Mr. Joyce. Mr. Johnson, you mentioned in your
2305 testimony of the potential danger that the world will face if
2306 we allow adversaries like China to lead on commercial
2307 wireless communications. How can this body empower domestic
2308 industries to ensure that the U.S. continues to be that
2309 global leader?

2310 *Mr. Johnson. Thank you, Congressman. I think this
2311 body has done a lot already through the CHIPS Act and the
2312 Bipartisan Infrastructure Law. It -- this body has done what
2313 it needs to do on spectrum authority. My former employer in

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2314 the Senate needs to -- need to make that happen. But it is
2315 what I said in my opening. We need more commercial spectrum.
2316 We need coherent processes for deployment so that when
2317 spectrum is allocated, innovators can deploy and serve. And
2318 then we need to harmonize global spectrum bands.

2319 *Mr. Joyce. I think you recognize that, from a
2320 bipartisan basis, from this Subcommittee on Energy and
2321 Commerce, we are committed to doing that.

2322 Mr. Chairman, I would like to take just a few seconds of
2323 personal license if I may. One of my senior staff -- this is
2324 his last day as part of our team. Mr. Fred Sodnick, who has
2325 been an integral part of my role here on Communications and
2326 Telecom, came to me over four years ago, suffered through a
2327 grueling interview, and was able to be part of the leadership
2328 team of our legislative staff. He is the son of proud
2329 parents, both Lou and Desiree. He hails from Wildwood, New
2330 Jersey. But he has made Pennsylvania and his commitment to
2331 Energy and Commerce part of his goals. And I would like
2332 everyone to join in with me in thanking Mr. Sodnick for --
2333 and wish him the best of luck. [Applause.] Thank you, Mr.
2334 Chair, and I yield.

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2335 *Mr. Latta. Thank you. The gentleman yields back, and
2336 the Chair now recognizes the gentleman from Texas for five
2337 minutes.

2338 *Mr. Weber. Thank you, Mr. Chairman. I am new to the
2339 committee, and I wasn't here for a lot of your all's
2340 testimony. So I'll probably have some redundancy. That is
2341 just a note from the department of redundancy department
2342 before I start. But I want to start with you, Mr. Gillen.
2343 You said that -- or I'm sorry -- Mr. Johnson. You just said
2344 with Dr. Joyce here we need more commercial spectrum. And of
2345 course I'm coming up to speed on all this infrastructure and
2346 all the spectrum and the use of it. How do we -- if it is a
2347 finite source or -- how do we get more?

2348 *Mr. Johnson. The most basic answer is we -- we need to
2349 have a strategy, a thoughtful, discerning, urgent strategy to
2350 free up commercial spectrum. A lot of that is held in -- by
2351 federal agencies, including Department of Defense.
2352 Department of Defense operates a number of very important
2353 capabilities on that spectrum, and we need to find a way to
2354 free it up for commercial use because the core strength of
2355 our country is the economic -- economic and technological

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2356 vitality that will come from commercial innovation. That
2357 feeds into DoD strength. It feeds into national strength.
2358 And even in -- you know, to get real specific, it feeds into
2359 the strength of weapons systems, both defensive and
2360 offensive.

2361 *Mr. Weber. Well, let me follow that up with that same
2362 -- thought. Are there companies that use the spectrum that,
2363 indeed, they're commercial companies, whatever you want to
2364 call them, that undergird some of the processes of Department
2365 of Defense?

2366 *Mr. Johnson. Oh, absolutely. There is the defense
2367 industrial base is -- is --

2368 *Mr. Weber. That is a good term.

2369 *Mr. Johnson. -- a very important sector. It includes
2370 a lot of otherwise commercial companies than it includes what
2371 we traditionally know as defense contractors. And so
2372 absolutely it is a very important part of the --

2373 *Mr. Weber. All right, thank you. Mr. Gillen, I am
2374 going to jump over to you. You said that you see full-power
2375 licenses around the world, I think was what you said earlier.
2376 Elaborate on that. But you don't see it here?

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2377 *Mr. Gillen. Not enough, sir. Right now, the focus is
2378 on something we call mid-band spectrum. It goes really far,
2379 and it carries a lot. So we talk about how we use these
2380 devices more and more every year. It is really helpful to
2381 get this out to as many Americans as possible. The challenge
2382 we have, as Mr. Johnson just alluded to, the government
2383 controls roughly 12 times more of this than the commercial
2384 industry does. And so how do we do want's happening across
2385 the world is that we can be -- use that spectrum we have more
2386 efficiently. We are not making any more. You are exactly
2387 right. But we can be more efficient with it.

2388 And I think we have seen, working to this committee,
2389 win-win opportunities where we can help agencies get more
2390 efficient systems, get new systems, and give a space -- have
2391 commercial operations at the same time.

2392 *Mr. Weber. Are there leaders and more efficient
2393 systems today?

2394 *Mr. Gillen. I would say the commercial wireless
2395 industry has improved its efficiency 40 times over this last
2396 decade. I think it is something that, when you paid billions
2397 of dollars for something, you get everything you can out of

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2398 it. So I think there is a huge amount of investment to use
2399 this as efficiently and effectively as we can.

2400 *Mr. Weber. At some point, that radiofrequency highway
2401 becomes super crowded and has rush-hour traffic. How far off
2402 from that are we?

2403 *Mr. Gillen. Without this committee's leadership, we
2404 are way too close to that. I think we are -- we are in a
2405 good place right now. But what you see, what's happening
2406 around the world, we need to keep getting spectrum out to
2407 commercial users to keep up with all the things we want these
2408 networks to do.

2409 *Mr. Weber. Mr. Assey, I'm going to come to you. If
2410 you were the chair of FCC, what would you do?

2411 *Mr. Assey. You know, that is like lobbyist 101 is not
2412 to tell the chair of the FCC what to do but, look, I think --

2413 *Mr. Weber. The chair is not listening.

2414 *Mr. Assey. The chair is always listening. You know,
2415 as I mentioned in my testimony, I think the basic mechanism
2416 that we have, we have the FCC that looks at the civilian uses
2417 of spectrum. We have the executive branch and NTIA, which
2418 deals with the competing uses among all the different

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2419 government users and agencies. You know, that is the right
2420 structure. The problem we face is they are not making any
2421 more spectrum. Consumers are demanding data. Government
2422 users are demanding data. We all need it all the time
2423 everywhere, and we have to figure out new strategies that
2424 will allow us to be able to do both. You know, we --

2425 *Mr. Weber. Let me break in. I have got nine seconds.

2426 *Mr. Assey. Sure.

2427 *Mr. Weber. Is there a model to follow, whether it is
2428 China, the way they deal with spectrum, or any other country?
2429 Is there a model to follow?

2430 *Mr. Assey. We have the best model, which relies on --

2431 *Mr. Weber. Well, that is not encouraging.

2432 *Mr. Assey. Well, it -- we can make it work. I believe
2433 we can make it work.

2434 *Mr. Weber. Okay. Well, I appreciate that. I am seven
2435 seconds -- Mr. Chair, I yield back. Thank you.

2436 *Mr. Latta. Thank you. The gentleman yields back --
2437 excuse me -- and the chair now recognizes the gentlelady from
2438 New Hampshire for five minutes.

2439 *Ms. Kuster. Thank you, Mr. Chair, and thank you to our

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2440 witnesses for being here today to discuss the future of
2441 wireless networks in America. Unfortunately, that future and
2442 our nation's ability to remain a global wireless leader came
2443 into question last night when the FCC's authority to auction
2444 spectrum was allowed to expire. As we discussed today, this
2445 is literally the first time that Congress has failed to
2446 protect this critical function of the FCC, and it is simply
2447 unacceptable.

2448 Spectrum is the backbone of our nation's communication
2449 networks that millions of Americans rely upon every single
2450 day for work, for telehealth, for school, for education, for
2451 entertainment and, most importantly for many of us, to
2452 connect to our loved ones. Mr. Assey, I appreciate your
2453 testimony and the importance of unlicensed spectrum to
2454 provide Americans with everyday technologies like Wi-Fi. Can
2455 you speak further to the FCC's role in ensuring that
2456 sufficient unlicensed spectrum remains available for this
2457 important service?

2458 *Mr. Assey. Sure. This is an area where I think the
2459 FCC really showed itself to be a trailblazer and put us on a
2460 path back in the '80s to really open up this band for

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2461 innovators and other people who could develop technologies
2462 and services that would use this technology. As I mentioned
2463 most recently, the FCC's action in opening up the 6 gigahertz
2464 band promises to usher in a whole new wave of innovation in
2465 this space. We have gone part of the way. We have developed
2466 rules that govern low-power indoor devices that provide three
2467 times the amount of bandwidth, lower latency, more security.
2468 Companies like -- cable companies like Comcast are actively
2469 rolling out those technologies to customers. And we have
2470 further advances in Wi-Fi technology that are going to be yet
2471 another step change and unlock a whole new series of
2472 applications when we get to things like virtual reality and
2473 augmented reality. So the future is bright.

2474 And the benefit of unlicensed spectrum is that we can
2475 all participate in it, and we can all produce in it. And
2476 that is why we have always been a leader in the unlicensed
2477 space as a country. And that is why I think we have a great
2478 stake in the success of unlicensed, particularly not just at
2479 home but around the world as well.

2480 *Ms. Kuster. Thank you. Thank you for sharing your
2481 expertise. In my district in New Hampshire, homes in rural

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2482 communities are often spread far from the nearest town or
2483 city center. This makes it difficult to provide fast,
2484 reliable broadband services to these households, to say
2485 nothing of the geography and Mount Washington in the middle.
2486 I want to ask Mr. Gillen, if I could, how wireless can help
2487 to close the digital divide for hard-to-reach rural areas.
2488 And it's not relevant in my district. But I'll add for my
2489 colleagues tribal areas.

2490 And now that the FCC's auction authority has lapsed, how
2491 will this impact the ability of your wireless companies to
2492 provide broadband services to my constituents in New
2493 Hampshire or to other rural parts of the country?

2494 *Mr. Gillen. Thank you for the question. It is
2495 critical. Spectrum is -- we are only as good as, as much
2496 spectrum as we have. And as everything Mr. Assey said about
2497 the FCC trailblazing and unlicensed access, we would like
2498 that same focus now on license, that we want that same amount
2499 of spectrum that would be able to innovate and grow with.
2500 And I think fixed wireless is now a solution that can get to
2501 more and more homes quickly, that it is an opportunity now
2502 with 5G Home.

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2503 We are seeing opportunities. Accenture projects that
2504 with additional spectrum that this could reach 43 percent of
2505 rural Americans in the next few years. And time is critical
2506 because those folks don't have connectivity today. And it
2507 also goes back to the BEAD Program that this committee drove,
2508 a technologically neutral approach. The implementation -- is
2509 not focusing on all the solutions available. We think that
2510 fiber is a place for that program. We also think wireless
2511 does too. Every community is going to need to make a
2512 difference between quickness, speed, what's available and the
2513 finite amount of money that's available to them.

2514 So I think the more solutions we put towards rural
2515 America, the better we are because it is hard. And we all
2516 need to be working towards that because we need everyone
2517 connected to do all the things we want to do.

2518 *Ms. Kuster. Is there any technological benefit of
2519 wireless over wired, if you will, for geography, for
2520 mountainous areas, for hard-to-reach places?

2521 *Mr. Gillen. Every community is different. Every mix
2522 is different. I think absolutely that if you have to get
2523 fiber all the way to the house, wireless has a benefit if it

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2524 can be from a tower. There is topography and other
2525 challenges. There is other ways of doing it. But it really
2526 gets down to these hard-to-reach communities are absolutely
2527 hard to reach. But absolutely wireless, if you can do it
2528 more quickly with -- with a -- you don't have to get all the
2529 way to the house, particularly in really expensive areas.
2530 That's a solution.

2531 *Ms. Kuster. Great. Thank you very much. My time is
2532 up, and I yield back.

2533 *Mr. Latta. Thank you very much. The gentlelady's time
2534 has expired, and the Chair now recognizes the gentleman from
2535 Georgia for five minutes.

2536 *Mr. Allen. Thank you, Chair Latta, and thank you to
2537 our witnesses for being here today. Obviously, we are all
2538 disappointed that, last night, the FCC's authority to auction
2539 spectrum expired. You know, it looks like we have got a lot
2540 of players in this whole process. And trying to get
2541 everybody on the team has been difficult. As we work to make
2542 up for this lost time and developing -- improving our
2543 spectrum technologies, obviously the agencies need to become
2544 more flexible, which is a bit of a problem everywhere in this

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2545 administration. And responsive to the needs of our private
2546 partners, of course this latest development has moved us in
2547 the exact opposite direction. I understand that we are in a
2548 global race here.

2549 And I am proud that the House last week did pass H.R.
2550 1108. And I hope the Senate will hurry along with that as
2551 well. But tell me about the mid-band spectrum. And how does
2552 -- can it ensure the U.S. retains global leadership in the
2553 wireless industry, Mr. Gillen?

2554 *Mr. Gillen. It absolutely can. It is critical. And
2555 why mid-band is important is that it is a blend of both
2556 capacity, that it can carry all the healthcare, everything we
2557 are trying to do with the spectrum. It can go further. We
2558 need to get from Augusta to Evans and beyond. And beyond is
2559 about -- mid-band gets us there. Full-power mid-band is
2560 really the key to a lot of what the rest of the world is
2561 using because of those propagation characteristics. So a lot
2562 of the conversation is around mid-band because we don't have
2563 a lot of it available commercially in the United States. We
2564 see others using it. We think it is a key part of the
2565 solution to meet America's needs going forward.

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2566 *Mr. Allen. Well, now that the FCC's auction authority
2567 has expired, we must reauthorize it so that the FCC can take
2568 action on pending applications to provide service in the 2.5
2569 gigahertz band. Isn't 2.5 gigahertz valuable mid-band
2570 spectrum that combines capacity and coverage, meaning it is
2571 particularly valuable to my rural areas in my district?

2572 *Mr. Gillen. Yes, sir.

2573 *Mr. Allen. Okay. Mr. Assey, how does spectrum sharing
2574 work, and what -- what are the challenges or opportunity with
2575 spectrum-sharing technologies to get us out of this current
2576 restriction that we are dealing with?

2577 *Mr. Assey. I think spectrum-sharing technologies have
2578 the ability to create win-win solutions when the alternative
2579 is kind of somebody has to lose. I think this is one of the
2580 great developments we have seen. And, you know, frankly we
2581 are not just seeing here. We are also seeing a lot of work
2582 going into this around the world as well. And the reason is
2583 because the uses that we have, both on the commercial side
2584 and the governmental side, continue to increase. And this is
2585 a promising technology of unlocking spectrum quickly so that
2586 we can get it to use rather than waiting around for, you

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2587 know, the fifth of never.

2588 So the other -- the other piece of that is that, you
2589 know, these technologies, particularly with CBRS, have the
2590 ability to bring many more people into the ecosystem to
2591 really develop that richness, that rich, competitive
2592 ecosystem in the wireless industry that not only benefits
2593 consumers but will benefit, you know, the broader industry as
2594 well. And that is a way in which we can support these types
2595 of experiments through a balanced policy that focus on
2596 everything.

2597 *Mr. Allen. Mr. Johnson, is it possible that -- of
2598 course we have got, you know, the private and then the public
2599 users of spectrum. Is it possible that the public users
2600 could get into sharing as well to free up some of that space?

2601 *Mr. Johnson. I think it is not only possible. It is
2602 imperative. And I'm -- you do not want to -- a lawyer
2603 determining how you divvy all this up. But we have to have
2604 spectrum available for commercial use as a national security
2605 imperative. There are ways to do that, and we will let the
2606 experts to my right determine how that happens. But the key
2607 point is more commercial spectrum and as a crucial national

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2608 security imperative.

2609 *Mr. Allen. Exactly. But we can't lose this race --

2610 *Mr. Johnson. No.

2611 *Mr. Allen. -- as I see it; is that correct? Does
2612 everyone agree with that? Okay.

2613 *Mr. Johnson. I don't think it's an overstatement to
2614 say that if we lose this race, we lose market democracy.

2615 *Mr. Allen. Okay. All right. Well, thank you so much
2616 for your time. And Chairman, I yield back.

2617 *Mr. Latta. Thank you. The gentleman yields back. The
2618 chair now recognizes the gentleman from Idaho for five
2619 minutes.

2620 *Mr. Fulcher. Thank you, Mr. Chairman, and thank you,
2621 panel, for your time and expertise here today. A question
2622 for Ms. Ghosh. I look at your resume, and you have got
2623 electronic engineering training, experience in the private
2624 sector, government and academia. And that poses a background
2625 that I would like to explore in terms of your perspective on
2626 something.

2627 5G and its networking capability and access is something
2628 that is very exciting to me. Artificial intelligence and its

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2629 potential processing capacity is very exciting to me. The
2630 potential of those two being combined is frightening to me.
2631 Can you take about a minute and tell me if my fears are
2632 warranted or not.

2633 *Dr. Ghosh. So artificial intelligence, the way I look
2634 at it in terms of 5G and wireless, is really another tool
2635 that we can use to manage the performance of the networks
2636 much better. So I think the parts of artificial intelligence
2637 that we have to be very careful about is when you go into the
2638 human aspect of it. You know, are there biases being
2639 created? Is the artificial intelligence way of optimizing a
2640 network somehow going to automatically disadvantage people in
2641 a lower-income neighborhood because they are not paying, you
2642 know, top dollar for their services.

2643 So we definitely have to make sure that we are aware of
2644 the pitfalls of using artificial intelligence without any
2645 restrictions on it. But it is a powerful tool.

2646 *Mr. Fulcher. If I could ask you because I have some
2647 questions for the others. Are you frightened of that
2648 combination?

2649 *Dr. Ghosh. No, I'm not.

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2650 *Mr. Fulcher. Okay. Thank you.

2651 *Dr. Ghosh. I am very hopeful that we will work out a
2652 way.

2653 *Mr. Fulcher. Okay.

2654 *Dr. Ghosh. Yes.

2655 *Mr. Fulcher. Thank you. I'm shifting gears now, and I
2656 would like to ask just a little bit less than a minute on
2657 this from each of our other panelists, please. If innovation
2658 and a free-market competitive environment is our goal, what
2659 is the proper role of government in achieving that in your
2660 industry? And what is a bridge too far? I will start with
2661 Mr. Gillen. A little less than a minute, please.

2662 *Mr. Gillen. Absolutely. Thank you, Congressman.
2663 Access to spectrum is number one for us, is creating --
2664 empowering the FCC to auction spectrum, identifying spectrum
2665 for auction and then letting the -- the highest bidder win
2666 and to take advantage of -- and then leverage that to deliver
2667 service for America. So that is the key for us. That is the
2668 input we need to make a difference.

2669 *Mr. Fulcher. Thank you. Mr. Assey?

2670 *Mr. Assey. I would say auction is one tool. But at a

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2671 broader sense, it is making commercial spectrum available
2672 using a balanced approach that includes all of the above and
2673 also addressing the needs of government users and
2674 coordinating amongst many different government -- government
2675 agencies.

2676 *Mr. Fulcher. Thank you. Mr. Johnson?

2677 *Mr. Johnson. Agree. And just stated maybe a different
2678 way, it is setting up the innovators for success. That means
2679 giving them the spectrum that they need. It means giving
2680 them processes that are coherent and final. And it means
2681 helping harmonize those bands globally.

2682 *Mr. Fulcher. Thank you. And to the panelists, just --
2683 I'll just close with this comment. I am not a veteran on
2684 this committee. I have had some experience in the technology
2685 sector and in academia. But I am very sensitive. And I
2686 think we, as a committee, are very sensitive to where those
2687 boundaries are for regulation. So easily sometimes we can
2688 stifle innovation and competitiveness. So finding that happy
2689 medium, finding that place where -- where it's necessary but
2690 encouraging to competition and innovation is where we are
2691 trying to be. Please help us get there. Mr. Chairman, I

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2692 yield back.

2693 *Mr. Latta. Thank you. The gentleman yields back. The
2694 chair now recognizes the gentlelady from Tennessee for five
2695 minutes.

2696 *Mrs. Harshbarger. Thank you, Mr. Chairman, and thank
2697 you to the witnesses for being here. Listen. This has been
2698 invaluable to me. I am a new member as well, and I am the
2699 other pharmacist on the panel, the youngest. You know, when
2700 reading Mr. Johnson's statement about China allocating
2701 spectrum, it caused me to look into -- a little deeper into
2702 6G research. And I read an article that stated at the end of
2703 2021, China's government had built the largest 5G mobile
2704 infrastructure in the world with 1.43 million base stations
2705 accounting for over 60 percent of the global total.

2706 And it also stated that, after having its 5G network up
2707 for a month, Beijing officially launched R&D into the 6G
2708 ahead of schedule. And this was probably the most
2709 frightening for me. It also stated that China has the most
2710 6G patents in the world, and it has 40.3 percent of the 6G
2711 filings, mainly focused on 6G infrastructure. Now, this is a
2712 question for the whole panel. At the end of the day,

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2713 Americans -- you know, they can sell all the spectrum in the
2714 world. But if we can't build our infrastructure out, it is
2715 worthless. So my question is how important is permitting
2716 reform to ensuring that any newly released spectrum results
2717 in a better and more effective experience? And I guess we
2718 can start with you, Mr. Gillen.

2719 *Mr. Gillen. Thank you. It is a really important
2720 question. And I think when you look at -- in China, if they
2721 want to deploy a cell tower, they do it that day.

2722 *Mrs. Harshbarger. That day.

2723 *Mr. Gillen. There is no zoning. There is no anything.
2724 It just happens. That is not necessarily what we need to
2725 replicate. But we need to do faster here too.

2726 *Mrs. Harshbarger. Yeah.

2727 *Mr. Gillen. Too many communities. It costs too much.
2728 It is too complex to process, and there is not time frames
2729 involved to make sure the communities' interests are
2730 addressed but also to let us get out and build faster. It
2731 also goes to the power and the propagation of these signals
2732 that there is some spectrum that just works better in rural
2733 areas than others, and we need to make sure we are focusing

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2734 on those. And on your question about 6G, we have really
2735 smart engineers starting that conversation.

2736 *Mrs. Harshbarger. Mm-hmm.

2737 *Mr. Gillen. Right now, we are in the first inning of
2738 5G. This is really just the beginning of what we are doing.
2739 And so I think that we need to stay focused on 5G. There is
2740 absolutely the right engineers working towards what 6G future
2741 is. And you are exactly right in terms of patents, in terms
2742 of standards. China is trying to take a leadership role, and
2743 we need to be aware of that. You know, Mr. Johnson's call
2744 for warning on all those things is exactly right.

2745 *Mrs. Harshbarger. Well, let's hope the Senate watches
2746 this hearing so they will get on the stick. Yes, sir,
2747 Mr. Assey?

2748 *Mr. Assey. I would agree with what Mr. Gillen said. I
2749 mean, spectrum is obviously an input. But really it is not
2750 -- spectrum is only as good as the infrastructure --

2751 *Mrs. Harshbarger. Absolutely.

2752 *Mr. Assey. -- it's going to ride over. And we have to
2753 be able to build infrastructure efficiently with government
2754 permitting as well. But it is actually much broader than

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2755 that because, you know, as Mr. Gillen said, if in China --
2756 they can basically make it happen and put the pole up, you
2757 still have to get the pole -- the wire attached to the pole.
2758 So there are a lot of other things that can impede our
2759 execution of actually following through and building on
2760 broadband. And permitting is one. Access to poles is
2761 another. Supply chain, and it goes on. So it is a -- it is
2762 a very difficult problem we face. But in talking about
2763 spectrum, we should not lose focus on the need to execute on
2764 these strategies and actually build the infrastructure.

2765 *Mrs. Harshbarger. Absolutely. I don't even think
2766 deadlines would -- they would respond to deadlines, as Mr.
2767 Gillen said. Yes, Doctor?

2768 *Dr. Ghosh. Yes. There is a lot of 6G initiatives
2769 happening already in the U.S. I am part the Next G alliance
2770 that is already working on 6G standards, 6G interest groups
2771 in the National Spectrum Consortium. So I'm pretty
2772 comfortable that the U.S. is still in a leadership position
2773 on 6G. Going to infrastructure, I think that, especially
2774 when you are talking about rural areas and underserved areas,
2775 to me, the fundamental problem of infrastructure there is one

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2776 of lack of backhaul. You know, you cannot get fiber fast
2777 enough to most places. So we have to start thinking about
2778 alternative ways of getting backhaul. Satellite is one.

2779 *Mrs. Harshbarger. Yeah.

2780 *Dr. Ghosh. Fixed point-to-point links using, you know,
2781 the high frequencies where there is a lot of bandwidth and
2782 others. So we have to, you know, take a whole approach to
2783 spectrum and how is best used.

2784 *Mrs. Harshbarger. Yeah, because we have to make
2785 decisions. I serve a rural area. And there is not broadband
2786 in a lot of the counties. And, you know, we have struggled
2787 on how to do that temporarily or do you do a -- you know, an
2788 infrastructure that is good for a long, long time. So
2789 understand that. Yes, sir?

2790 *Mr. Johnson. Same thing. Yes, ma'am. And I'm -- we
2791 live -- we presently live in Northeast Georgia --

2792 *Mrs. Harshbarger. Oh.

2793 *Mr. Johnson. -- close to Tennessee.

2794 *Mrs. Harshbarger. You are right up my -- I'm --

2795 *Mr. Johnson. That's right.

2796 *Mrs. Harshbarger. Yeah. I get there in four hours.

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2797 *Mr. Johnson. We live in a little valley where we have
2798 -- I still have -- I have DSL internet.
2799 *Mrs. Harshbarger. Oh, my gosh. Son, you need to move.
2800 *Mr. Johnson. Works okay, but it's -- you know, there
2801 -- there are times where the layout of the mountains and
2802 valleys --
2803 *Mrs. Harshbarger. Yeah.
2804 *Mr. Johnson. -- is going to determine what works best.
2805 *Mrs. Harshbarger. It absolutely does.
2806 *Mr. Johnson. So many on our -- my fellow witnesses
2807 have said, it takes different approaches and different
2808 topographies. And so particularly the BEAD program, the
2809 implementation of the Bipartisan Infrastructure Law, needs to
2810 account for that. Not every valley --
2811 *Mrs. Harshbarger. Yes.
2812 *Mr. Johnson. -- is the same so --
2813 *Mrs. Harshbarger. No. I mean, East Tennessee is
2814 absolutely not like Chicago.
2815 *Mr. Johnson. Yeah.
2816 *Mrs. Harshbarger. Are you kidding?
2817 *Mr. Johnson. And they all have to have broadband.

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2818 Where we live, a lot of -- a lot of kids do their homework in
2819 the McDonald's parking lot. It is not okay. It is not good.
2820 Back to my point, it is not good for national security if a
2821 big part of our country doesn't have access to broadband.

2822 *Mrs. Harshbarger. I think he's tapping out. So with
2823 that, I yield back.

2824 *Mr. Latta. The gentlelady's time has expired, and the
2825 gentlelady from Florida is recognized for five minutes.

2826 *Mrs. Cammack. Well, thank you, Mr. Chairman, and thank
2827 you to all our witnesses for appearing before the committee
2828 here today. I think it is pretty clear. It is essential for
2829 us to lead as the United States on spectrum policy to remain
2830 competitive not just today but for tomorrow as well. And I
2831 am going to piggyback off of what my colleague from Tennessee
2832 was saying. So I represent North Florida, North Central
2833 Florida, the heart of the Sunshine State. And I also serve
2834 as a member of the House Ag Committee. So I am optimistic
2835 about the world that spectrum, both licensed and unlicensed,
2836 can play to support efficient production through precision
2837 agriculture. So I would like to direct this question to both
2838 Mr. Gillen and Mr. Assey.

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2839 Can you speak to some of the current cases of spectrum
2840 in the agricultural production and future potential benefits
2841 in the sector? I'll start with you.

2842 *Mr. Gillen. Thank you. One of the things, we are
2843 excited about the impact this can have on farming. I think
2844 to the conversation we just had, there has to be connectivity
2845 first.

2846 *Mrs. Cammack. Yes.

2847 *Mr. Gillen. That we can have the best solutions in the
2848 world until there is connectivity. We don't need that. So
2849 we need to make sure there is spectrum available. In terms
2850 of actually what is happening in precision agriculture, we
2851 see a new wave of innovators seeing what 5G can do. Some of
2852 the AI capabilities that the doctor spoke about a minute ago
2853 that Trellis is one in Georgia that is helping farmers stay
2854 on their land, helping drive yield, increasing irrigation
2855 that helps -- gives the sensors -- give them the tools to
2856 actually do their job in real-time. And so we are seeing
2857 some of this first wave of innovators.

2858 You know, in 4G, we saw the sharing economy, app
2859 economy. We saw all those things happen on the 4G platform.

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2860 5G can do so much more in the enterprise space and to help
2861 businesses do their job. So we are just scratching the
2862 surface. But companies like Trellis give us a lot of
2863 encouragement we are on the right path.

2864 *Mrs. Cammack. Excellent.

2865 *Mr. Assey. Yeah. I think it is an exciting area for
2866 innovation to kind of take hold. And it kind of goes to what
2867 I spoke in my testimony about the industry looking at not
2868 just getting broadband to the House but really creating the
2869 cloud around which you live. You know, we are going to use
2870 the BEAD program, and hopefully we're going to connect a lot
2871 of farmhouses. We don't want to be able to go beyond that
2872 farmhouse to cover the fields and to help the farmers provide
2873 the information, the technology that they are going to need
2874 in the modern age. And I think that there is no one
2875 solution. You know, 5G will be a solution in some places.

2876 Unlicensed spectrum can be used to extend connectivity
2877 out of doors. And the -- and CBRS is a great example of
2878 where we can bring more people into this ecosystem and allow
2879 them to develop the solutions that best meet their own needs.

2880 *Mrs. Cammack. So I know this has been kind of touched

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2881 on a couple different ways. But I think just to make it
2882 concise and clear, why is it so important that NTIA remain
2883 the sole manager of federal spectrum rather than separate,
2884 independent management of agency spectrum? And we'll start
2885 here and go down the line.

2886 *Mr. Johnson. I think what we saw in the -- in the
2887 C-band issue with deployment of 5G and FAA, the danger is
2888 that that plays out in every sector of the economy and
2889 therefore, every regulator, every federal agency. We all
2890 have, in -- the further we get into the 5G era, the further
2891 we are going to be in an era where every sector has equities
2892 in spectrum. And we have to have coherent processes that
2893 determine how it's -- how it's allocated. And once that
2894 process is finished, it needs to be finished.

2895 Whether it is federal with the NTIA or commercial with
2896 the FCC, we have to have processes that end, and then
2897 deployment can begin.

2898 *Mrs. Cammack. Absolutely.

2899 *Dr. Ghosh. So the U.S. is the only country in the
2900 world that even as two agencies that regulate spectrum, one
2901 for commercial and one for federal. It is bad enough; right?

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2902 And now if you take every agency that NTIA represents and if
2903 they were all going to have a separate voice, it is just not
2904 manageable. So we have to be able to have a cohesive picture
2905 to the world. It makes the U.S. look very indecisive if we
2906 are not able to resolve, you know, our own conflicts between
2907 spectrum domestically. So absolutely. It is absolutely
2908 essential that the NTIA is the only agency that represents
2909 the federal interests. Thank you.

2910 *Mr. Assey. I don't think I can really add to that, but
2911 we have a lot of federal users, and we need some way in the
2912 executive branch to coordinate the varying interests they
2913 have.

2914 *Mr. Gillen. I agree with everything said, just add the
2915 key to why it is important is certainty, if you are asking
2916 companies to spend billions of dollars on these assets, you
2917 need to know that what you actually bought, you are going to
2918 be able to use. And so having that one agency -- or as
2919 Doctor correctly noted, we do have two, that we do that in a
2920 way that creates certainty across the ecosystem for both
2921 agencies and the commercial sector.

2922 *Mrs. Cammack. Absolutely. Thank you for making that

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2923 point crystal clear. And thank you again to the chairman. I
2924 yield back.

2925 *Mr. Latta. Thank you. The gentlelady yields back, and
2926 the chair recognizes the gentleman from California for five
2927 minutes.

2928 *Mr. Obernolte. Thank you very much, Mr. Chairman.

2929 Mr. Gillen, I would like to start with you. First of
2930 all, let me thank you for delivering your comments
2931 extemporaneously and not merely reading. I feel like when we
2932 are having a hearing like this, we do a much better job being
2933 evocative with each other if we don't merely just read to
2934 each other. I just want to let you know that we notice, and
2935 I appreciate it.

2936 You showed, at the beginning of your testimony, a
2937 graphic that I thought was really compelling showing a
2938 five-times increase in consumer demand for data by the year
2939 2027. And that is a theme that has been echoed in the
2940 testimony that we have heard today. In fact, I think Mr.
2941 Assey reference consumers' endless demand for data, is the
2942 way you put it. And I think that is an important discussion
2943 to have because, as Congresswoman Clark mentioned when you

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2944 and she were having a discussion, that really is what is
2945 driving the need for more commercial spectrum, which is kind
2946 of underpinning the theme of today's hearing.

2947 But I want to ask you about that because I don't see how
2948 -- why that should necessarily be true. If you look at the
2949 evolution of cellular data technology, we start with sending
2950 texts to each other. We -- that grows to graphics when we
2951 had the bandwidth to do that. That grew to photographs. And
2952 then recently, video is commonplace, and we don't even think
2953 twice about viewing a video or a sports game on a phone.

2954 But what I see in the generation after this is the
2955 explosion of technology is like AI. It is very exciting to
2956 me that hobbyists have succeeded in getting AI stacks similar
2957 to Chat GPT to run on cell phones. So that is going to be
2958 amazing. But that doesn't necessarily mean that we need more
2959 data bandwidth to the device. So to what do you attribute
2960 this fivefold increase in demand in the next couple of years?

2961 *Mr. Gillen. Sure. A couple things, and it is a great
2962 question. The -- part of it is -- as you alluded to, we just
2963 use these devices more and more every day. So as the device
2964 has more speeds and capabilities, we just use them more in a

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2965 way that we didn't two or three years ago and continuing.
2966 What we are seeing with 5G is the proliferation of devices.
2967 It is not just this we are talking about. It is a lot of the
2968 sensors and other things we have talked about today that this
2969 is the proliferation of devices, the internet of things we
2970 all talk about. This is the connectivity. Some of the
2971 connectivity is going to be 5G. Some of the connectivity is
2972 going to be unlicensed but that we are going to see an
2973 explosion of demand as enterprises take advantage of this
2974 information and connectivity that it is just going to be more
2975 and more devices talking to the network, not necessarily each
2976 individual device using infinitely more.

2977 *Mr. Obernolte. But just to play devil's advocate --

2978 *Mr. Gillen. Sure.

2979 *Mr. Obernolte. -- we can only use one device at a
2980 time, so it is not like my refrigerator is going to watch the
2981 49ers game; right? I'm watching it on my phone. I'm only
2982 doing it one -- you know, I might switch to my iPad. I might
2983 switch to my computer. I might switch to my TV. But it is
2984 not clear to me that, you know, my refrigerator is going to
2985 have that same appetite for data.

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2986 *Mr. Gillen. Absolutely, and I think it is -- we sort
2987 of talked about the precision agriculture example a little
2988 bit before. Those aren't using a lot of data, but those
2989 sensors are feeding data back in real time without our
2990 involvement at all. And so I think some of the things are
2991 the information -- energy company using it to evaluate leaks
2992 in their system. There is going to be constant information
2993 flow coming so absolutely. Us individually as individuals,
2994 it is all the things that we are going to be empowering with
2995 this technology that really drive that usage.

2996 *Mr. Obernolte. All right. Continuing on that topic,
2997 Mr. Assey, you know, we have been using this rise in demand
2998 for data as a reason why we need to allocate more spectrum to
2999 commercial use. However, at the same time, we are pursuing
3000 new technologies that make more efficient use of the spectrum
3001 that we already have, things like better spectrum sharing,
3002 beam-conforming technologies, larger phased or raised
3003 antennas, you know, that really potentially -- especially in
3004 the 5G world have a potential to be game-changers. How much
3005 do you think of this increased demand those technologies can
3006 satisfy rather than needing more bandwidth.

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3007 *Mr. Assey. I should probably defer to Dr. Ghosh on
3008 that.

3009 *Mr. Obernolte. I'll allow you to.

3010 *Mr. Assey. But I just -- I will make the one point,
3011 which is that, you know -- and it doesn't matter whether you
3012 are a wired network or a wireless network. We are both kind
3013 of hybrids of the same. But it is going to be in our
3014 interest to be able to be able to push more data through the
3015 mediums that we have because the alternative is to have to
3016 basically devote more capital to expanding and expanding and
3017 expanding. So there is a real market incentive for us to try
3018 to be more efficient. And that is why, you know, cable's
3019 next generation of technology, 10G technology, is going to be
3020 even more efficient than the ones we have seen previously.

3021 *Mr. Obernolte. Well, I think that this is a discussion
3022 that obviously we are going to continue to have. Let's look
3023 forward to taking the first step, which is to regain FCC
3024 authority to actually auction spectrum. And fingers crossed
3025 that the Senate -- they will have another opportunity next
3026 week. John Dingell used to call them the cave of wins. I
3027 think they have an opportunity to prove him wrong. Let's

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3028 hope they do it. I yield back.

3029 *Mr. Balderson. [Presiding.] Thank you. Well, next
3030 up, I'd like to recognize myself. It just so happened I came
3031 up to the chair, but it was my turn. Sorry, Mr. Pfluger.
3032 But thank you all for being here today. And the question --
3033 my first question is for the doctor. Representative Kuster
3034 and I introduced a bill that would increase coordination
3035 between NTIA and FCC and require them to update their
3036 spectrum MOU regularly. I am glad our bill was approved
3037 earlier this week during our subcommittee markup, and I am
3038 hopeful this will help prevent future issues like we saw with
3039 C-band. I would like to start and then also hear from other
3040 witnesses. Outside of regularly updating their MOU, do you
3041 have any recommendations, Doctor, on how the FCC/NTIA can
3042 improve coordination on its spectrum issues?

3043 *Dr. Ghosh. Thank you for that question. So I think
3044 one of the key points of debate that arise when you are
3045 talking about spectrum issues is the underlying technical
3046 reasons assumptions. As I mentioned in my testimony, centers
3047 like SpectrumX actually have joined MOUs with the NTIA and
3048 the FCC. So we actually convene both agencies together to

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3049 really talk about what are the fundamental technical issues
3050 that need to be discussed.

3051 I think more regulations like that should be encouraged
3052 along with more dialogue between the agencies directly.
3053 Involving the broader community can only help make these
3054 decisions proceed better.

3055 *Mr. Balderson. Okay. Thank you, Doctor. Would
3056 anybody else on the panel like to add to that? Mr. Gillen?

3057 *Mr. Gillen. I would really echo the Doctor's comments.
3058 I think when you look -- we want these folks to be our
3059 spectrum experts. They need the resources to do that. It is
3060 the ITS lab in Boulder. We need to empower these experts to
3061 be able to -- one to make the calls and that everyone trusts
3062 that process. So it is critical that we have the underlying
3063 research and capabilities.

3064 *Mr. Balderson. Thank you. In your testimonies, many
3065 of you referred to the importance of spectrum pipeline and
3066 including the lower 3 gigahertz band in that pipeline. As
3067 you all know, and we have talked about it a little bit, the
3068 lower three is being used in Europe, China and other
3069 countries across the globe for 5G. But it is not being used

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3070 for the purpose in the United States. Can any of the
3071 witnesses explain the benefits of the global harmonization of
3072 spectrum bands and why it is so important? Mr. Johnson?

3073 *Mr. Johnson. Yes, sir. It bears repeating, I think,
3074 that if the United States can serve that band, it -- and it
3075 has -- it has global scale, then U.S. companies and
3076 allied-based companies that have large presence in the United
3077 States can compete and win. If we are not in that band, then
3078 China and Huawei, etc., have the advantage. And it is just
3079 that simple.

3080 *Mr. Balderson. It is. Agree. Doctor, would you like
3081 to --

3082 *Dr. Ghosh. Yes. So I think it is important to realize
3083 that economy scale are really important. And not being in
3084 that band, I would -- I would modify that statement a bit. I
3085 think pretty much all 5G technology that is being developed
3086 in the U.S. is actually capable of operating in that band.
3087 They don't because we don't have the license to do that. And
3088 I would reiterate that, actually, if we can even develop ways
3089 of sharing in that band, that puts the U.S. ahead. None of
3090 these other countries really have developed the sharing

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3091 capabilities and expertise that the U.S. has. And we should
3092 leverage that more, whether it is in the lower three or in
3093 other bands to expand our capabilities.

3094 *Mr. Balderson. Okay. Mr. Assey, would you like to add
3095 anything?

3096 *Mr. Assey. Yeah, no, I would agree with that. I mean,
3097 we have challenges in that band from a governmental sense
3098 that other nations may not. So we have to work through them.
3099 But the most important thing is can we focus on ways that we
3100 can make commercial spectrum available. And can we develop
3101 these types of sharing win-win solutions that will allow us
3102 to open the band up sooner rather than waiting to do it
3103 later.

3104 *Mr. Balderson. Okay. Mr. Gillen, please?

3105 *Mr. Gillen. It is a large block of spectrum. There is
3106 a lot of opportunities to both meet DoD's needs and meet the
3107 commercial needs and that when we look -- we need spectrum
3108 that, from a security reliability standpoint, is preemptable.
3109 A lot of the complex sharing we are doing today, federal
3110 government takes precedent. And commercial sector can't use
3111 it. So if we want spectrum, we want to invest \$35 billion a

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3112 year in, we need to know we are going to be able to use it.
3113 And I think these experiments are really important for us
3114 going forward. But we also have to recognize the full power,
3115 non-preemptable spectrum, is key to do a lot of things we
3116 wanted to do too.

3117 *Mr. Balderson. Okay. Thank you all very much. I am
3118 going to stop right there and yield myself back.

3119 Next up, the gentleman from Texas, Mr. Pfluger.

3120 *Mr. Pfluger. Thank you, Mr. Chairman, for saving the
3121 best for last. And I appreciate all of your testimony and
3122 your written testimony. I will apologize right now, Mr.
3123 Johnson, Dr. Ghosh. A lot of the questions that I was
3124 intending to ask you I think have already been asked. And so
3125 I am going to focus a little bit -- little bit differently.
3126 And let me just ask, for the two of you in the associations,
3127 that 3.1 to 3.7 gig range -- former Air Force pilot. Spent a
3128 lot of time with spectrum. Understand, you know, the dual
3129 use, the commercial versus the military very well. What are
3130 we competing against in the DoD side there that is -- I don't
3131 want to get stuck on this one but --

3132 *Mr. Gillen. In terms of what the military is --

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3133 *Mr. Pfluger. Yeah.

3134 *Mr. Gillen. -- looking for? It is largely a radar
3135 band, both ground and air. So you have -- AWACS is a big
3136 user of that. And that is one of those -- when you talk
3137 about a system that is ripe for advancement and innovation,
3138 it is --

3139 *Mr. Pfluger. Yeah.

3140 *Mr. Gillen. -- one of those that we think -- the
3141 win-win situations come, is that we can get Wedgetail, use
3142 Wedgetail to use different spectrum than they are using today
3143 that we have some more opportunities to open it up. But at
3144 its core, 3.1 to 3.7 has been a radar band.

3145 *Mr. Pfluger. It is largely AI.

3146 *Mr. Gillen. Yes.

3147 *Mr. Pfluger. Yeah. And you think that with the
3148 wedgetail and with some of the other innovations -- I mean,
3149 is there -- is there an opportunity to share it?

3150 *Mr. Gillen. There is absolutely options to share. I
3151 think there is geographic sharing.

3152 *Mr. Pfluger. Yeah.

3153 *Mr. Gillen. There is more complex sharing that there

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3154 -- that we have heard about as well.

3155 *Mr. Pfluger. Okay.

3156 *Mr. Gillen. I think it really comes down to -- and
3157 what we find this committee is really helpful at is, system
3158 by system, engineer to engineer, what is the right solution?
3159 Some may retune. Some move. Some stay the same.

3160 *Mr. Pfluger. Very quickly because I want to jump to
3161 another one.

3162 *Mr. Assey. And I was just going to say -- and this is
3163 exactly what engineers like Dr. Ghosh are trying to sift
3164 through, through that -- process.

3165 *Mr. Pfluger. Okay. It sounds like, from what I have
3166 heard and what I have read in your testimonies today, that
3167 there is kind of an all-of-the above approach. You know,
3168 there is an auction that's needed. There is, you know, other
3169 approaches, licensed and unlicensed. And I will just say,
3170 look, we spent billions of dollars the last couple years.
3171 And in an area like mine where we are truly a national
3172 security area, we produce the most energy out of any
3173 geographic region in the entire country.

3174 We have a tremendous amount of agriculture. But the

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3175 density of population is very, very low. And I find myself
3176 driving through my own district, going, "What happened?"
3177 You know? And so how do we -- you know, how do we get to the
3178 point where we actually do compete with China, where we are
3179 actually doing what we said we were going to do and provide
3180 that coverage to that last mile? This is 1930 with a lack of
3181 electricity in those farmhouses. I mean, how do we do it
3182 because I'm worried about it.

3183 *Mr. Gillen. Exactly right. I think part of it is
3184 spectrum. But as the panel has talked about, it gets down to
3185 infrastructure. And the cost in rural areas can be
3186 prohibitive. And so what is the role of government? The
3187 BEAD program is part of it. Right now, that is only going to
3188 be fiber. So it is not going to fix wireless or mobile
3189 wireless. The FCC promised a 5G fund in 2011, I believe. We
3190 still haven't gotten money dedicated to building out wireless
3191 in those really expensive areas. So it -- really going to
3192 take a partnership between government and industry to really
3193 reach all of those Americans while we continue to push
3194 forward.

3195 *Mr. Pfluger. Because a lot of the -- you know, we

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3196 hear, well, this is for rural broadband. And this money was
3197 for rural broadband. And I'm like I live in a rural area.
3198 Where is my broadband?

3199 *Mr. Assey. Yeah, no. I think it is a great point. And
3200 the BEAD program provides us with a great opportunity. There
3201 is a lot of capital out there, but as you say, you know, we
3202 have kind of heard this before in the sense that money that
3203 is going to rural America never gets to rural America. And
3204 it is one of the reasons I think we have to stay
3205 laser-focused on making sure that the capital that the
3206 government has provided is actually dedicated to those
3207 unserved and underserved areas that have been so long without
3208 infrastructure and where the economics to serve are so hard.

3209 *Mr. Pfluger. So am I to understand that the -- the
3210 money has not been appropriated for those areas like Highway
3211 158 between Garden City and Midland?

3212 *Mr. Assey. The program has -- we have allocated the
3213 money, and we are in the process currently. The Department
3214 of Commerce is about to allocate that money further among the
3215 states. And then it will be up to the states to distribute
3216 those funds pursuant to the rules that the Department of

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3217 Commerce has set. And, you know, I think Congress showed
3218 great leadership when it passed that legislation to make sure
3219 when we say unserved and underserved America, we mean it.

3220 *Mr. Pfluger. Well, thank you for that. And, you know,
3221 obviously this is a very -- I believe a lot of what has been
3222 said today, we have to compete. We have to do it well, even
3223 in areas that may be more difficult and are not quite as
3224 economic to the companies that you represent. We still have
3225 to provide the coverage there because they are actually
3226 providing something that is in the public interest, and that
3227 is energy and food. And we want people to move to those
3228 areas. And without coverage, many of the families don't do
3229 it because their kids can't learn, you know, in the school
3230 settings or their spouses can't work. They are remote. So I
3231 am very worried about that. I appreciate you all being there
3232 and going through the end. I think we are starting a second
3233 round of questions here shortly. I yield back, Chair.

3234 *Mr. Balderson. Thank you, Mr. Pfluger, for your humor
3235 also. All members have been recognized. Seeing there are no
3236 further members wishing to be recognized, I would like to
3237 thank all of the witnesses today for being here. Promise you

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3238 don't have another round of questioning. I ask unanimous
3239 consent to insert the record the documents included on the
3240 staff hearing document list. Without objection, that will be
3241 the order. Without objection, so ordered.

3242 Pursuant to committee rules, I remind members that they
3243 have 10 business days to submit questions for the record and
3244 ask the witnesses to respond to the questions promptly.
3245 Members should submit their questions by the close of
3246 business on March 24th. Without objection, the subcommittee
3247 is adjourned.

3248 [Whereupon, at 11:54 a.m., the Subcommittee was
3249 adjourned.]