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6 FROM EDGE TO CORE: PERSPECTIVE

7 ON INTERNET PRIORITIZATION

8 TUESDAY, APRIL 17, 2018

9 House of Representatives

10 Subcommittee on Communications and

11 Technology

12 Committee on Energy and Commerce

13 Washington, D.C.

14

15

16

17 The subcommittee met, pursuant to call, at 10:15 a.m., in
18 Room 2322 Rayburn House Office Building, Hon. Marsha Blackburn
19 [chairman of the subcommittee] presiding.

20 Members present: Representatives Blackburn, Lance, Shimkus,
21 Latta, Guthrie, Olson, Bilirakis, Johnson, Long, Flores, Brooks,
22 Collins, Walters, Costello, Walden (ex officio), Doyle, Welch,

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23 Clarke, Loeb sack, Ruiz, Dingell, Eshoo, Engel, Matsui, McNerney,
24 and Pallone (ex officio).

25 Staff present: Jon Adame, Policy Coordinator,
26 Communications and Technology; Daniel Butler, Staff Assistant;
27 Robin Colwell, Chief Counsel, Communications and Technology;
28 Kristine Fargotstein, Detailee, Communications and Technology;
29 Sean Farrell, Professional Staff Member, Communications and
30 Technology; Adam Fromm, Director of Outreach and Coalitions;
31 Elena Hernandez, Press Secretary; Tim Kurth, Deputy Chief
32 Counsel, Communications and Technology; Lauren McCarty, Counsel,
33 Communications and Technology; Austin Stonebraker, Press
34 Assistant; Evan Viau, Legislative Clerk, Communications and
35 Technology; Hamlin Wade, Special Advisor, External Affairs; Jeff
36 Carroll, Minority Staff Director; Jennifer Epperson, Minority FCC
37 Detailee; David Goldman, Minority Chief Counsel, Communications
38 and Technology; Jerry Leverich, Minority Counsel; Jourdan Lewis,
39 Minority Staff Assistant; Dan Miller, Minority Policy Analyst;
40 Andrew Souvall, Minority Director of Communications, Outreach and
41 Member Services; and C.J. Young, Minority Press Secretary.

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42 Mrs. Blackburn. The Subcommittee on Communications and
43 Technology will now come to order.

44 You notice that we are starting just a couple of minutes late.
45 We understand that the Environment hearing downstairs started a
46 couple of minutes and we are trying to accommodate the chairman
47 of the full committee and the ranking member of the full committee
48 to get up here for their opening statements, and I recognize myself
49 for five minutes for an opening statement.

50 Good morning everyone, and to our witnesses thank you for
51 being here and welcome. We are here to talk about prioritization.
52 Not just paid prioritization -- all prioritization online.

53 Despite what some of my colleagues sometimes seem to think,
54 prioritization is not a dirty word. The internet, in fact, is
55 based on it.

56 In the net neutrality conversation there is a common
57 misconception that the internet is one big highway where all the
58 cars travel at the same speed and we cannot allow for any fast
59 lanes to exist without causing a big traffic jam for everybody
60 else.

61 It is something like this picture that we are going to put
62 up on the screen. It ran into a jam.

63 [Laughter.]

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64 Mrs. Blackburn. Yes, we are in need of some prioritization
65 here. Okay. No, that's the wrong picture. See if we can --
66 okay.

67 Our witnesses today know that this could not be further from
68 the truth and the next picture we are going to put up in fact is
69 probably a lot closer to reality but is still an oversimplified
70 idea of the internet. Different connections, agreements,
71 prioritization, depending on the needs.

72 And the amazing new capabilities that we will experience on
73 next-generation networks will be realized not only through
74 innovation in the chips and the servers and the infrastructure,
75 but also through even more efficient and effective
76 prioritization.

77 I would also point out that in real life, all sorts of
78 interactions are prioritized every day. Many of you sitting in
79 this room right now paid a line-sitter to get priority access to
80 this hearing.

81 In fact, it is commonplace for the government itself to offer
82 priority access to services. If you have ever used Priority Mail,
83 you know this to be the case.

84 And what about TSA pre-check? It just might have saved you
85 time as you traveled today. If you define paid prioritization

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86 as simply the act of paying to get your own content in front of
87 the consumer faster, prioritized ads or sponsored content are the
88 basis of many business models online, as many of our members
89 pointed out during the Facebook hearing last week.

90 Prioritization is sometimes crucial from a public policy
91 standpoint. Just as we all want the ambulance and the fire truck
92 to be prioritized over the rest of the traffic on the highway,
93 there is a need for voice packets to be prioritized over data
94 packets to make sure that your 911 calls get through first and
95 there are lots of other examples where we can all agree that
96 certain data and certain applications should be prioritized on
97 the network.

98 One of our witnesses is pioneering a technology to provide
99 real-time audio support to the visually impaired, describing the
100 surroundings and the nonverbal interactions taking place around
101 the user.

102 Other examples that our witnesses will discuss today include
103 telemedicine and autonomous vehicles. Prioritization of data on
104 the network is not unique or uniquely harmful.

105 It may be an uphill climb, but what we are trying to do with
106 this hearing is to be -- to leave aside the simplistic "fast lane"
107 talking points and kick off a more realistic discussion on the

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108 subject.

109 My net neutrality bill left out the old language banning all
110 paid prioritization because I believe that we need a more nuanced
111 approach and a more thorough and thoughtful discussion.

112 For the government to consider a ban on any prioritization
113 on the internet, paid or unpaid, we need a better understanding
114 of what specific harmful conduct we are trying to address and a
115 better understanding of how to leave the door open for the
116 beneficial prioritization that's necessary to keep the internet
117 as we know it working and to bring even more benefits to consumers.

118 Now I recognize the ranking member, Mr. Doyle, for five
119 minutes for an opening statement.

120 Mr. Doyle. Thank you, Madam Chair, for holding this hearing
121 and thank you to the witnesses for appearing before us. I'd like
122 to in particular thank Matt Wood, a proud Pittsburgher, for being
123 here today.

124 This subcommittee is once again discussing net neutrality
125 and the fallout from Chairman Pai's repeal of the 2015 open
126 internet order.

127 This short-sighted act has created an uncertain landscape
128 where innovators and entrepreneurs trying to develop new
129 services, applications, and devices can be taxed, tolled, or

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130 blocked at any time by an ISP.

131 Prioritization practices that were once required to meet the
132 standard of reasonable network management as judged by federal
133 experts and network engineering, telecommunications, and
134 competition policy at the FCC will now be determined by an ISP's
135 bottom line.

136 As I've talked to companies large and small that developed
137 deployed new applications in the wake of the 2015 net neutrality
138 rules, their message was clear -- that the certainty created by
139 the rules was stoking investment and giving certainty to investors
140 and that consumers were benefitting from these new offerings.

141 A number of companies I talked with were working to deploy
142 services that directly competed with ISP's own offering at lower
143 prices, bringing what we can all agree is a much needed competition
144 to a stagnant marketplace.

145 I am deeply concerned that as we move forward in a world
146 without the open internet rules, ISPs will once again act in
147 anti-competitive ways intended to tamp down competition and
148 consolidate their old over their consumers.

149 We have already seen ISPs zero rate data from their own
150 services and their affiliates while forcing users to either limit
151 usage on competing apps or pay costly overage fees.

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152 If we look at the history of the internet before net
153 neutrality, we find a number of instances where ISPs use their
154 market position to stifle innovation and prevent competitors from
155 bringing new products to market, all while coming to Congress and
156 the government arguing that they were only thinking about the
157 consumer.

158 Today, it seems we are adding another chapter to that book.
159 Today, we are talking about the prioritization of the internet
160 content.

161 If the testimony of a number of our witnesses is to be
162 believed, paid prioritization can bring great benefits to the
163 internet. They claim that the coming flood of data can only be
164 dealt with by prioritizing it and creating incentives and
165 opportunities for websites and edge providers to pay to get their
166 packets to consumers before their competitors.

167 Well, frankly, I don't believe it. We have heard these
168 arguments before. The truth is giving ISPs the ability to play
169 gatekeeper only benefits the ISPs and their shareholders and it
170 significantly hurts innovators and consumers.

171 More than that, it fundamentally undercuts the level playing
172 field and open marketplace that defines the internet economy.

173 Now, I have a bill that has 160 co-sponsors in the House with

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174 companion legislation with bipartisan support in the Senate to
175 fix this mess.

176 Our CRA would reinstate the 2015 open internet rules and
177 restore the FCC to its expert oversight role over ISP network
178 practices.

179 When you look at the polling on this issue, these rules have
180 overwhelmingly bipartisan support with a vast majority of
181 Democrats, Republicans, and Independents, and I hope to work with
182 my friends on the other side of the aisle to make this bill
183 bipartisan as well.

184 Madam Chair, I'd also like to raise a process issue leading
185 up to today's hearing. Mr. Bennett, who was first to submit his
186 testimony, amended his submission yesterday afternoon in
187 meaningful ways.

188 I am concerned that many of the changes to Mr. Bennett's
189 written submission were of a substantive and factual nature and
190 that is of great concern to us.

191 I don't believe the committee should get into the practice
192 of allowing such last-minute changes. When we have witnesses do
193 this, the committee process breaks down and it also -- it leads
194 to many of us just questioning whether the testimony will be
195 credible.

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196 I'd also like to note that baseball season is starting here
197 in Congress. I had my team out on the field for the first time
198 today and, like baseball, these markets cannot function without
199 clear rules and a ref to call balls and strikes.

200 The word is that ISPs want us to live in one where there is
201 no referee and where there are no reals. The game only ends when
202 the other team and all the fans go home because they are just sick
203 of watching one team playing by their own rules.

204 I don't want to live in that world and neither do the American
205 people.

206 Madam Chair, I'd like to ask unanimous consent to have the
207 following documents into the record: letters from InCompass, the
208 American Academy of Pediatrics, the National Association of
209 Realtors, and the Center for Connected Health Policy.

210 Mrs. Blackburn. Without object.

211 [The information follows:]

212

213 *****INSERT 1*****

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214 Mr. Doyle. Thank you very much, and I yield back.

215 Mrs. Blackburn. The gentleman yields back.

216 The chairman of the full committee, Mr. Walden, you're
217 recognized for five minutes.

218 The Chairman. I thank the chairman.

219 Thank you all for being here. We appreciate your expert
220 testimony as we try to wade into this issue and get to the facts.

221 This subcommittee in particular has had -- has long led the
222 way in exercising oversight over the internet. As we will hear
223 today, the internet looks nothing like it did when it was first
224 fully commercialized back in 1995.

225 Back then, networks were in their nascent stage and network
226 management presented a different set of problems. But today,
227 with users sending over a 100 exabytes of data per month, networks
228 have had to continually adapt to manage congestion and will need
229 to do so even more adeptly and efficiently in the future.

230 The development of these networks and their ability to handle
231 the ever growing traffic demands users place on them is truly and
232 innovative feat and not one that consumers often think about
233 because when you turn on your computer or unlock your phone, the
234 network -- the internet just works.

235 Because it appears so simple, it's easy for consumers to

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236 think about the internet connections being managed by their ISP
237 -- their internet service provider -- from one end to the other
238 and for years consumers were told the internet was an information
239 superhighway, giving the false impression that all internet
240 traffic is moving the same direction on an equal plane at the same
241 time.

242 We even use the word traffic to describe the movement of
243 information and data across the internet but it's actually a lot
244 more complicated than that.

245 The internet is not a highway where there can be so-called
246 fast and slow lanes. The internet is actually a network of
247 networks with many layers managing the data that flows across it.

248 There are applications layers that establish the connection
249 and encrypt data. There is the transport layer that prepares data
250 for transport and there is the network layer which identifies the
251 packet routing sequence.

252 Within these layers there are many different players aside
253 from your ISP involved in managing traffic. Devices, software,
254 wi-fi routers, and content delivery networks, or CDNs, can all
255 load, manage, and relay traffic in different ways.

256 We will hear from our witnesses today a more in-depth
257 explanation of how the internet actually works, not just talking

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258 points, and the role prioritization plays in operating networks.

259 But in a basic sense, prioritization has nothing to do with
260 traffic speed. Rather, it's putting certain bits over others to
261 ensure that all packets arrive to their destination on time.

262 A complete ban on prioritization would not permit this and
263 would not allow some services and applications to operate
264 smoothly. In other words, prioritization currently exists
265 across the internet architecture and it necessary to ensure the
266 internet functions properly.

267 It's also worth noting that while we have heard a lot from
268 our friends at the edge providers about how prioritization is bad
269 for business, those operating at the edge pay to prioritize
270 traffic every day through the use of various interconnection
271 agreements including CDN.

272 In order to facilitate high demand applications like video
273 streaming, many of the most popular content providers don't send
274 data over the public internet.

275 Rather, they directly interconnect with the CDN, allowing
276 the edge providers' traffic to be prioritized to provide a better
277 user experience.

278 It's estimated that by 2021 CDNs will carry 71 percent of
279 global internet traffic. Today is not the first time this

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280 committee has considered how to best legislate the issue of
281 prioritization.

282 I released a draft -- I released draft legislation last
283 Congress that would establish rules of the road to ensure the
284 internet remains open to all.

285 Similarly, Chairman Blackburn introduced her Open Internet
286 Preservation Act at the end of last year. Rather than waste our
287 efforts on partisan legislation like the CRA, we hope our
288 colleagues on both sides of the aisle will join our effort to
289 development legislation that will provide lasting solutions to
290 some of the outstanding questions regarding internet traffic
291 management.

292 What exactly do we mean and what harms are we trying to
293 address in restricting internet prioritization, whether paid or
294 unpaid, whether the content's affiliated or not.

295 So I agree with Chairman Blackburn that in order to move
296 forward along -- toward a long overdue legislative solution, we
297 need to be able to have this conversation in a nuanced in-depth
298 manner and figure out a common ground.

299 So I look forward to hearing from all the witnesses. I would
300 just tell you we have another hearing going on downstairs so a
301 lot of members have to bounce back and forth. But we do have your

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302 prepared testimony and we appreciate your participation in this
303 very important discussion about the future of the internet.

304 With that, Madam Chair, I yield back the balance of my time.

305 Mrs. Blackburn. The gentleman yields back.

306 Mr. Pallone, you're recognized for five minutes.

307 Mr. Pallone. Thank you, Madam Chair.

308 The internet is a powerful engine of economic growth and a
309 potent platform for free speech. With a working broadband
310 connection, anyone can work from home, sell their own products
311 online, and connect with companies a world away.

312 And in the past few years we have seen how the internet can
313 help everyday launch a worldwide political movement. But the
314 power of the internet is rooted in the principles of net
315 neutrality.

316 These principles are simple and well understood. Broadband
317 companies cannot pick internet winners and losers by blocking or
318 slowing down content or charging extra for fast lanes.

319 It's a question of fairness and there are no loopholes.
320 Until the Trump administration took over the FCC, even the
321 broadband providers themselves supported these principles,
322 including a flat ban on fast lanes.

323 The largest providers told us time and again that they agreed

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324 that paid prioritization should be prohibited. They said that
325 they had no intention of charging anyone extra for faster speeds.

326 But recently those voices have gone silent and that silence
327 presents a real threat to small businesses and speech online.
328 Where there was once agreement on a prohibition on fast lanes,
329 some now want to add loopholes to net neutrality. The reasoning
330 is convoluted and confusing. They argue that somehow allowing
331 broadband providers to charge small companies extra for internet
332 fast lanes is good for small business. But that makes no sense
333 and no one's buying it.

334 Small businesses oppose having to pay extra for fast lanes.
335 So do telemedicine companies, disabled veterans groups,
336 self-driving car companies, churches, nonprofit, and the list
337 goes on.

338 Net neutrality advocates have spoken loud and clear. We
339 want everyone to have a faster internet, not just the chosen few
340 who can afford to pay extra, and that's why Democrats on this
341 committee introduced the LIFT America Act to bring faster
342 broadband to everyone.

343 The only ones who want broadband providers to charge money
344 for fast lanes are the broadband providers and despite these
345 latest attempts to muddy the water and create confusion, banning

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346 paid prioritization is not a new issue.

347 The FCC solved this problem when it passed net neutrality
348 in 2015. At that time, the FCC correctly banned these fast lanes
349 with the exception of certain specialized services like health
350 care.

351 The FCC got it right in 2015 and the Trump FCC got it wrong
352 when it killed net neutrality last year, and that's why I support
353 the legislation introduced by Ranking Member Doyle that would
354 restore the well-crafted and balanced 2015 protections and I
355 encourage any of my colleagues who support real net neutrality
356 to sign on to Ranking Member Doyle's CRA as well.

357 The CRA is the best way to put net neutrality back in place
358 and support small businesses, and I'd like to yield the remaining
359 time to Ms. Eshoo.

360 Ms. Eshoo. I thank our ranking member and good morning,
361 everyone, and to the witnesses. Welcome, and thank you for being
362 here.

363 We are now a decade into the fight to protect net neutrality,
364 and throughout that time there have been many arguments from those
365 who oppose it -- that it will kill jobs, it would harm investment,
366 or hurt the free press.

367 All of these have been refuted each and in turn. This is

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368 actually, I think, a very simple issue. It's about fairness and
369 equal access to an essential resource, the internet.

370 The 2015 open internet order created the strongest most
371 reliable rules to protect that level playing field for innovation.
372 The courts and the FCC both acknowledged that net neutrality was
373 critical to the virtuous cycle that has enabled the internet to
374 act as a tool of growth, of innovation, of investment, and of free
375 expression.

376 That same FCC found that paid prioritization is inherently
377 harmful to that fruitful cycle that fuels education, jobs, and
378 our economy.

379 Yet now we have the same companies who proclaim in full-page
380 newspaper ads that they support net neutrality. But they are
381 pushing for an exception for prioritization.

382 This is about money. This is about money. We should just
383 all acknowledge that and have a debate about it. But it's all
384 about money.

385 We may be a decade down the road but it's about the same thing
386 that it always has been about and that is who controls the onramps
387 to the internet, being able to pick winners or losers, and that's
388 based on pay to play. It is about money.

389 I don't blame companies for wanting to make money. That's

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390 what they are in the business to do. But we have an obligation
391 to the public and I think that's what this debate is about.

392 So I look forward to hearing from the witnesses and I think
393 everyone knows exactly where I stand on this.

394 [Laughter.]

395 Ms. Eshoo. I yield back. Thank you.

396 Mrs. Blackburn. The gentlelady yields back. Mr. Pallone
397 yields back, and this concludes our member opening statements.

398 I will remind the committee that each member's opening
399 statement will be made a part of the permanent record for the
400 committee.

401 We thank your witnesses for being here today and you all are
402 going to have the opportunity to give your opening statements,
403 followed by a round of questions from our members.

404 Our panel today, Mr. Richard Bennett, founder of High Tech
405 Forum; Mr. Peter Rysavy -- am I saying that properly?

406 Mr. Rysavy. Rysavy.

407 Mrs. Blackburn. Rysavy. President of Rysavy Research; Mr.
408 Paul Schroeder, director of public policy and strategic alliances
409 at Aira Tech Corporation; and Matt Wood, policy director at Free
410 Press.

411 We appreciate each of you for being here today and for

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412 providing your testimony.

413 Mr. Bennett, we begin with you. Please, each one of you as
414 you speak, turn your microphones on and, Mr. Bennett, you are
415 recognized for five minutes for an opening statement.

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416 STATEMENTS OF RICHARD BENNETT, FOUNDER, HIGH TECH FORUM; PETER
417 RYSAVY, PRESIDENT, RYSAVY RESEARCH, LLC; PAUL W. SCHROEDER,
418 DIRECTOR, PUBLIC POLICY AND STRATEGIC ALLIANCES, AIRA TECH
419 CORPORATION; MATT WOOD, POLICY DIRECTOR, FREE PRESS

420

421 STATEMENT OF MR. BENNETT

422 Mr. Bennett. Good morning, Chairman Blackburn, and hello
423 to Chairman Walden, Ranking Member Doyle, and Ranking Member
424 Pallone, and members of the committee, especially Ms. Eshoo, whose
425 district I used to live in and who gave me a really hard time the
426 first time I testified before this committee but I probably
427 deserved it.

428 Prioritization has been part of the internet's design from
429 the beginning in that there is a type of service field in the
430 internet protocol header, and it's been refined through
431 integrated services, a standard design in the 1990s, then
432 differentiated services, so not by itself anything controversial
433 about prioritization.

434 And I think it's fair to say that while it was controversial
435 for a time, it's come to be recognized there is a consensus sort
436 of support that, done correctly, prioritization is beneficial to
437 applications.

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438 So we have reached this consensus, I think, after about 15
439 years of debate around what we call net neutrality now, that it's
440 legitimate for ISPs, CDNs, transit networks, and purpose built
441 networks like WebEx to accelerate time-sensitive traffic.

442 If you go back to the original paper that Chairman Wheeler
443 wrote on net neutrality, he points out that the internet is
444 inherently biased against real-time applications as a class and
445 biased in favor of content applications and I think if we are not
446 careful about how we treat paid prioritization we can make that
447 bias worse, and that's something we should try to avoid.

448 I think we also -- going back to the consensus question, we
449 also believe that competition is a good thing. We want tech
450 policies that increase that.

451 So prioritization and the related technologies such as
452 resource reservation, traffic shaping, and dynamic path selection
453 have not only become commonplace but I think they are widely
454 regarded as essential to certainly the real-time applications
455 part of the internet.

456 The -- and this is good, because no matter how much capacity
457 networks have, we can also always make their operation more
458 efficient if we apply optimization techniques and we -- there are
459 certain problems that we solve without optimization that you can't

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460 really build your way out of simply by throwing more capacity at
461 the problem.

462 It's like trying to solve, you know, throwing money at
463 problems that you don't really understand.

464 And I think we appreciate that prioritization mechanisms
465 such as the IEEE 802.11(e) standard that I helped design are
466 beneficial to real-time applications such as voice in the same
467 way that LTE bearers are.

468 The fact that one is provided free on a closed enterprise
469 network and the other is sold as part of a bundle that includes
470 carrier grade voice I think is -- doesn't really impact on their
471 utility. These are useful things. We found that with -- by
472 prioritizing voice and wi-fi we get four times as many voice calls
473 through a wi-fi network.

474 But it's hard to explain the continual increases in broadband
475 speed we have seen in the U.S. over the last 10 years -- speed
476 improves 35 percent per year -- without giving some credit to the
477 expectation of profit.

478 The fact that web speeds have stagnated over this same
479 period, even declining in 2016, suggests something is wrong with
480 the web's financial model and I think you, the committee, explored
481 that last week.

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482 But leaving the consumer broadband market questions aside,
483 paid prioritization internet optimization is very important to
484 enterprises that have to connect, say, branch offices to
485 headquarters.

486 The traditional way to do that was to leases, and in some
487 cases still is widely done. People lease business data services
488 lines like a T-1 for \$300 a month and only gives you 1.5 megabits
489 per second.

490 But with prioritization you could actually -- with the proper
491 management you could actually use a public common internet
492 connection to connect the branch office to the headquarters.

493 And so now you're getting 50 to 250 megabits per second for
494 less than \$100 per month. But this only works -- you can only
495 have that cost savings if you're -- if someone is prioritizing
496 the traffic on the pipe.

497 So let's bear in mind that while there are fees for these
498 things, the alternatives are also -- can also be quite costly.

499 So it's important, I think, to recognize the internet is no
500 longer just a research network. The internet is the network. It
501 has replaced all the other -- I mean, not quite completely but
502 in the next few years all the other networks are going to be
503 subsumed by the internet.

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504 So we can't apply the sort of oh, like, research network
505 standards to the internet. We have to recognize that the
506 fundamental -- the fundamental requirement is that it serves all
507 the needs of all the used cases of all the people who connect to
508 it.

509 And I think whatever it takes to do that is fine, you know,
510 given the proper oversight.

511 [The prepared statement of Mr. Bennett follows:]

512 *****INSERT 2*****

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26

513

Mrs. Blackburn. The gentleman yields back.

514

Mr. Rysavy. There we go.

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515 STATEMENT OF MR. RYSAVY

516

517 Mr. Rysavy. Chairman Blackburn -- is this on? Ranking
518 Member Doyle, and other distinguished members of the
519 subcommittee, thank you for the opportunity to testify at this
520 important hearing.

521 I am president of Rysavy Research, an analyst in the wireless
522 industry with more than 25 years of experience. When I started,
523 the hot new wireless technology was 1G.

524 I am an expert in wireless technology. I've worked with many
525 dozens of firms and have published more than 175 reports and
526 articles. My testimony is on 5G.

527 5G will start to be deployed as early as this year -- end
528 of this year -- and will become the dominant wireless technology
529 through the 2020s. It is being designed and developed by
530 organizations, individuals from all over the world, and will
531 employ sophisticated mechanisms to handle different kinds of
532 traffic flows.

533 This is critical because 5G is being designed to address a
534 much wider range of use cases than prior generations of
535 technology.

536 Many of the applications envisioned for 5G are of a control

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537 nature and that means they need minimal delay and high
538 reliability.

539 These types of applications, whether it's controlling drones
540 in real time or robots or sending emergency messages to autonomous
541 vehicles, will depend on traffic prioritization.

542 5G's reliance on traffic prioritization should not be viewed
543 as problematic for internet traffic that will not be prioritized.
544 Traffic differentiation and prioritization is not a zero sum game.

545 You can prioritize certain traffic flows without adversely
546 affecting other users' applications. The goal in managing
547 network traffic is to maximize the quality of experience across
548 the entire subscriber base.

549 5G needs QoS management not only for traffic prioritization
550 to support mission critical applications but also enable a
551 fundamental architectural component called network slicing.

552 Again, is being designed and developed for cellular
553 operators to deploy on a global basis. Network slicing,
554 implemented through virtualization, will allow an operator to
555 provide different services with different performance
556 characteristics customized for the specific use cases involved
557 such as those needing low latency enhanced reliability.

558 Even with new spectrum and expected peak through-puts that

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559 will exceed a gigabit per second, 5G networks will still have to
560 manage latency, reliability, massive numbers of connections, and
561 a mix of stationary and mobile users.

562 Capacity alone is not the solution. The United States has
563 assumed global leadership in 4G. It enjoys deep LTE 4G
564 penetration, leading smart phone platforms and the vibrant
565 application ecosystem. But globally, countries and companies
566 are investing in and concentrating on what will come next with
567 5G.

568 Constraining 5G with rules that restrict traffic management
569 necessary for the traffic flows anticipated with 5G applications
570 could threaten U.S. leadership in mobile technology and
571 deployment.

572 Thank you.

573 [The prepared statement of Mr. Rysavy follows:]

574

575 *****INSERT 3*****

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576

Mrs. Blackburn. The gentleman yields back.

577

Mr. Schroeder, you are recognized for five minutes and I will

578

give you a warning at 30 seconds. How's that?

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31

579 STATEMENT OF MR. SCHROEDER

580

581 Mr. Schroeder. Thank you very much. Good morning. I
582 think the microphone is on.

583 Thank you, Chairman Blackburn, members of the subcommittee.
584 Very pleased to be with you this morning. My name is Paul
585 Schroeder and I am here on behalf of Aira, a San Diego-based
586 technology company.

587 Our groundbreaking service provides instant access to visual
588 information for people who are blind or visually impaired. As
589 such, our service relies on the transmission of streaming video
590 from the network edge through mobile up to the internet without
591 interruption at ultra-low -- high speeds to ensure ultra-low
592 latency connection between the blind individual and the remotely
593 located sighted assistant who is providing information based on
594 the video feed.

595 We leverage mobile communications as well as innovative
596 technologies such as the smart glasses that I am wearing, and yes,
597 there is a camera in the middle of these glasses that is connected
598 to an agent as we speak.

599 We also use GPS and other sensors, augmented reality, and
600 are incorporating machine learning. Besides the technology,

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601 Aira's success really depends on our human agents.

602 They are highly trained, they are paid, they are held to a
603 confidentiality requirement, and they do undergo background
604 checks before they serve as an agent.

605 Our customers -- we call them explorers -- pay for access
606 to a fixed number of minutes per month. We are, though, working
607 with agencies such as the Department of Veterans Affairs to ensure
608 that blind veterans have access to this critical service.

609 I also want to note that Congressman Peters and Congressman
610 Rutherford have been very helpful in leading a bipartisan effort
611 to ensure that the VA is paying attention to these new
612 technologies.

613 This week, Aira has designated the congressional office
614 buildings as free Aira zones. This was a choice we made because
615 there is a large group of individuals who are blind visiting this
616 week and we know that this will help them navigate the halls of
617 Congress more effectively.

618 We encourage others to do this, and I do want to note for
619 Chairman Blackburn your home state airport of Memphis was the
620 first one to join the Aira Airport Network, paying for the minutes
621 of Aira users at Memphis airport in order to get around the
622 airports more effectively.

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623 Yesterday, two of our Aira explorers ran the Boston Marathon
624 using Aira. Now, most of us, blind or sighted, probably aren't
625 going to run a marathon. But the test of a low latency available
626 network was put to the test at the marathon, and many of us will
627 have opportunities to test that in other environments, for
628 example, hustling through an airport trying to find the gate for
629 our airplane, checking out bus signs in a crowded bus garage to
630 figure out the one that we need, quickly looking at a chart or
631 slide in a meeting or a classroom, or maybe a congressional
632 hearing, in order to get the information from that slide as a
633 person who's blind, putting information into these kiosks that
634 are popping up everywhere in order to order or confirm a
635 reservation, and, of course, reading a medication label to ensure
636 that we are actually taking the right medication.

637 For those of us who are blind or visually impaired using Aira,
638 we need instant access to this information. We need a network
639 that is reliable and a network that has low latency because our
640 video is able to stream upward from the mobile edge.

641 We are particularly pleased to note our partner, AT&T, has
642 offered dynamic traffic management to Aira to ensure that our
643 users have the low latency network and reliable connectivity that
644 they need and our agents need as well.

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645 I am pleased to say this morning I am joined by an agent --
646 Amy, are you there?

647 Agent. I am. Good morning, Paul.

648 Mr. Schroeder. Oh, I left the speaker by the phone. Do you
649 want to do a very quick description of the room, please?

650 Agent. Absolutely. I see three rows of a desk and that have
651 white wood on the bottom of them and then a darker mahogany on
652 the top of the desk and they are separated by an aisle in the middle
653 and the very back of the room has a single panel of speakers. I
654 see the chairwoman is in the very middle of the room. A gentleman
655 to her left is waving at me.

656 [Laughter.]

657 Agent. American flags that are flanking the center --

658 Mrs. Blackburn. Thirty seconds.

659 Agent. -- three windows directly across --

660 Mr. Schroeder. I am going to have you hold up and we'll come
661 back to you if there's a question for the agent.

662 We are investing in artificial intelligence as well so that
663 we can bring automation to our service and we are, of course,
664 looking forward to the emergence of 5G, which will help our low
665 latency network and service be even stronger.

666 Finally, I just want to say we encourage policymakers to

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667 support policies and programs that will promote and expand
668 reliable access to visual information such as what Aira is
669 providing as a right to those of us who are blind or visually
670 impaired.

671 Thank you.

672 [The prepared statement of Mr. Schroeder follows:]

673

674 *****INSERT 4*****

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675

Mrs. Blackburn. The gentleman yields back.

676

Mr. Wood, five minutes.

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677 STATEMENT OF MR. WOOD

678

679 Mr. Wood. Chairman Blackburn and Ranking Member Doyle, and
680 members of the subcommittee, thank you for having me here today
681 to testify.

682 Free Press is a nonpartisan nonprofit with 1.4 million
683 members and we were founded 15 years ago to elevate people's voices
684 in policy decisions that shape our media.

685 Today, we believe that achieving racial justice and social
686 justice require equitable access to technology and information.
687 That's why we work on net neutrality.

688 We supported the strong rules recently and wrongly repealed
689 by the FCC and we support Congressman Doyle's resolution to
690 restore them, and we are not alone.

691 Hundreds of members have co-sponsored that resolution in the
692 House and Senate. Thousands of businesses and organizations and
693 state and local officials support it, too.

694 Millions of people have made their voices heard, first, at
695 the FCC and then in these halls, opposing that repeal and calling
696 on you to pass the CRA.

697 That's not surprising because, as Mr. Doyle noted, poll after
698 poll shows the net neutrality rules enjoy tremendous popular

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699 support across party lines.

700 One poll last summer showed that 72 percent of Republicans
701 supported the 2015 rules. Another taken before the FCC's
702 December vote found that 83 percent of all respondents oppose that
703 repeal.

704 Free Press supports restoring the entire 2015 order because
705 we need more than three bright lines to preserve the open internet.
706 We need FCC authority to prevent new forms of discrimination and
707 also to address digital divides, protect privacy, and promote
708 competition.

709 Yet some people claim that paid prioritization bans are
710 harmful and they say that ISPs should be able to charge new kinds
711 of fees and that internet users and businesses would benefit from
712 such new charges.

713 They also say this would help with last mile congestion
714 without explaining its scope or accounting for the ways the
715 networks already deal with that.

716 As a general matter, prioritizing rather than building
717 capacity to solve any last mile congestion over a sustained period
718 would let ISPs profit from artificial scarcity.

719 It would let them charge more to get through the bottleneck
720 rather than building a bigger path. So paid prioritization is

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721 not just a solution in search of a problem; it's a toll booth in
722 search of a traffic jam.

723 ISPs' own data shows that under Title 2, both broadband
724 investment and deployment speeds increased markedly in rural and
725 urban areas alike.

726 Despite that evidence, some still insist that strong rules
727 made ISPs invest too little. Now, funnily enough, we are told
728 that the rules may make ISPs invest too much by requiring them
729 to build both excess capacity instead of prioritizing their way
730 out of congestion.

731 Whatever the investment incentives of the paid
732 prioritization ban, discarding this rule would cause a radical
733 change to the internet.

734 That ban prohibited ISPs favouring traffic only in exchange
735 for payment from a third party or to benefit an ISPs affiliates
736 such as video or voice offers.

737 In other words, it not ban the kinds of user-directed and
738 application-driven traffic management techniques praised by
739 others here today.

740 Those kinds of practices leave ISPs' customers in control
741 when it comes to choosing how to use those connections and those
742 customers already can and do choose to buy faster speed tiers when

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743 they so desire.

744 They could even buy what's called a quality of service tier
745 to use on applications of their choosing and at times of their
746 own choosing.

747 Long-standing network protocols also can and do make these
748 kinds of choices neutrally. ISPs don't need to inspect our
749 internet traffic as they transmit or to second guess how to treat
750 it.

751 The paid priority rule banned none of these network
752 management techniques. It applied only if the ISP tried to make
753 a content provider pay extra just to reach broadband customers
754 or just to cut in line ahead of other traffic.

755 People already pay for their connections. The websites and
756 apps they visit should not suddenly ask -- be asked to do so, too.
757 So if I visit marshblackburn.com or mikedoyleforcongress.com on
758 my home connection, those websites don't have to pay my ISP to
759 reach me.

760 Let me be clear. I am not here to defend bid edge providers
761 from such payments. I represent internet users. But letting
762 gatekeeper ISPs impose new tolls would distort the choices users
763 have and ISPs undoubtedly would get together with those largest
764 edge providers to set the terms and prices for any such advantages.

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765 It would be inefficient for every edge provider to have to
766 strike such deals with every ISP in the country and signing up
767 for such deals means they'd be double charged for data that ISP
768 subscribers already paid to receive.

769 Academics can speculate that in a different kind of access
770 market such new fees might reduce subscriber costs. They still
771 do not explain why ISPs facing so little competition would have
772 any incentive to lower their retail prices.

773 So when ISPs executives talk about paid prioritization they
774 don't describe it as a way to reduce revenues or to replace the
775 source for those revenues. They talk about it as a chance to
776 increase their revenues.

777 That's why the notion that new ISP fees might benefit
778 internet users and reduce their prices brings to mind a joke I've
779 heard on several occasions. But with all due respect to the
780 originator of that joke, I think that the most terrifying words
781 in the language may be, "I am from the cable company. I am here
782 to save you money."

783 Thank you very much and I look forward to your questions.

784 [The prepared statement of Mr. Wood follows:]

785

786 *****INSERT 5*****

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42

787 Mrs. Blackburn. The gentleman yields back.

788 This concludes the testimony from our witnesses. We thank
789 you for that, and we will now move to our questions and answers.
790 I will begin and recognize myself for five minutes.

791 Mr. Bennett, I want to come to you first. I want to discuss
792 a tweet from Matthew Prince, the CEO of Cloudflare, from last
793 November.

794 This exchange occurred on the day the FCC made its Restoring
795 Internet Freedom order available to the public. Someone tweeted
796 a wish that a tech billionaire would buy out the local ISP where
797 Chairman Pai lives and throttle his internet access in retaliation
798 for reversing the previous commission's order.

799 Matthew Prince tweeted in reply, "I could do this in a
800 different but equally effective way." He went on to say he had
801 sent a note to his general counsel to see if Cloudflare could
802 throttle Pai's access without breaking any laws.

803 This tweet certainly raises a number of questions and, in
804 fact, it gave us the idea for this hearing. Was Matthew Prince
805 right, and if so, how could he have done this?

806 Mr. Bennett. Thank you for the question, Chairman
807 Blackburn.

808 I think the -- I remember that exchange. I got involved in

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43

809 it myself, actually. The reason that -- and I think what it
810 illustrates is how the construction of the internet, the structure
811 of the architecture has changed since the sort of founding days
812 of even really since Tim Wu came up with the idea for net
813 neutrality.

814 So instead of it being a system that consists of users
815 attached, you know, with their computers and mobile devices to
816 an infrastructure that's provided only by internet service
817 providers, the infrastructure is actually -- there's a lot going
818 on in the infrastructure today that didn't used to be there in
819 the very beginning and content delivery networks have been
820 mentioned several times and that's one example. It's --
821 technically, content delivery networks are edge services but it
822 turns out that all parts of the edge are not equal. So if you
823 put a content delivery network on a portion of the edge close to
824 the end user, then you, by that very act of simply locating the
825 data there, you have moved the data to the head of a line that
826 other suppliers of information that could be, say, on an average
827 of half a nation away would have to -- would have to join at the
828 back -- you know, CDNs put you at the front.

829 So Cloudflare has a number of -- they're actually quite
830 innovative products the company has. So it's sort of a -- it's

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44

831 hard to -- I am not completely a fan but some of the things they're
832 doing I think are very beneficial.

833 When -- one of the -- I think their primary product is the
834 DDoS protection mechanism so that, you know, sites can be subject
835 to denial of service attacks if they are on the wrong side of
836 popular opinion on certain topics and Cloudflare came up with a
837 way to protect sites that are being hammered with denial of service
838 attacks by simply putting a really high bandwidth kind of firewall
839 in front of the site that could absorb the denial of service attack
840 and allow the website to continue to function.

841 Of course, there are -- that doesn't always work the way it's
842 planned. The -- I used to be a visiting fellow at the American
843 Enterprise Institute and we published a blog called Tech Policy
844 Daily, and we used Cloudflare's free service to protect the blog
845 from denial of service attacks. AIE's the kind of organization
846 that's sort of a target for a lot of that sort of anti-social
847 behavior.

848 But I ran into a situation once where I was unable to access
849 the blog -- a post that I would written for the blog from my home
850 in Colorado due to a misconfiguration of the Cloudflare.

851 The Cloudflare had changed some IP addresses. They hadn't
852 told the people at AIE, and so the AEI server, which was not

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853 actually owned or controlled by Cloudflare -- it was just behind
854 the Cloudflare firewall -- was unreachable to me. But people in
855 D.C. could see it just fine. So it's, like, they were saying why
856 is this a problem.

857 Mrs. Blackburn. Let me interject and ask you one more
858 question on this. You talked about the CDNs, and as we look at
859 an individual user's access to certain content, who else within
860 this ecosystem would have the opportunity to control that access
861 or to control the speed of the individual's access?

862 Mr. Bennett. Well, the CDNs dump so much traffic on the
863 internet I think, as it's covered in the background memo for the
864 hearing, that they're actually in a position to affect the rate
865 at which non-CDN users can get their jobs done.

866 Mrs. Blackburn. Okay. My time has expired.

867 Mr. Doyle.

868 Mr. Doyle. Thank you.

869 A number of witnesses mentioned that 5G will precipitate the
870 need for greater prioritization. If we dramatically increase the
871 capacity of the network service, do we also need to dramatically
872 increase our ability to manage the scarcity of it?

873 Mr. Wood. I think not. Congestion doesn't solve every
874 problem, I heard other witnesses say, but it can solve a lot of

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875 them, and as I noted in my testimony, certain kinds of
876 prioritization actually do happen already. The question really
877 is who's being made to pay for that.

878 Mr. Doyle. You know, a number of witnesses also said in
879 their testimony they talked about the benefits of ISPs
880 prioritizing certain kinds of traffic over others -- for instance,
881 live video, telemedicine, and online games.

882 But what happens when you take the choice away from consumers
883 of which packets get to them first and ISPs are allowed to decide
884 which applications and application providers will have optimized
885 access to consumers and which ones won't?

886 I mean, to me it seems like the ISPs get to pick who wins
887 and who loses. What do you think?

888 Mr. Wood. Thank you, Congressman.

889 Yes, we agree. We think retaining that user choice and the
890 rights that users have is very important. And so you're right,
891 that certain kinds of traffic might have different network needs
892 at different times.

893 It should really be up to the user to choose not only which
894 kinds of traffic they might wish to pay for or prioritize but also
895 the source of that traffic. So will all video applications be
896 treated the say way -- that's a very tough question to answer when

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897 we are leaving that all within the ISPs' control.

898 Mr. Doyle. You know, let's talk a little bit about
899 competition. If ISPs were allowed to implement paid
900 prioritization for services such as telemedicine or other
901 services, do you think that would increase or decrease the number
902 of competitive offerings in that space?

903 Essentially, do you think small rural health practices or
904 small startups would want to compete against large health systems
905 and the ISPs themselves or other large institutional players?

906 Mr. Wood. Yes, Congressman. Thank you.

907 I think it would decrease the amount of competitors further
908 upstream, if you will. There's some notion that paid priority
909 could be used to level the playing field, I suppose, and let the
910 small businesses compete with the large businesses.

911 I can't see how that would work. I think that if there were
912 paid prioritization allowed, then naturally the companies with
913 the deepest pockets and the providers with the biggest bank
914 accounts would pay for that prioritization.

915 It wouldn't be used to level the playing field. It would
916 just be used to tilt it even further.

917 Mr. Doyle. You know, a number of witnesses here today have
918 alleged that the open internet order severely restricted the types

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919 of network management an ISP could engage in.

920 They also alleged that certain types of specialized service
921 offerings such as telemedicine work prohibit it. Further, they
922 claim that prioritization is necessary to ensure the quality of
923 certain services, services, it seems to me, that might be best
924 served using business data services, which I see are claimed to
925 be too expensive.

926 What do you make of that?

927 Mr. Wood. Well, there's a lot there. I do think that the
928 open internet order of 2015 did allow for reasonable network
929 management. It was the term of art used for several of the rules.
930 So even for blocking or for throttling, there were network
931 management exceptions.

932 For a prioritization, there was no such exception but, of
933 course, as I noted this morning, the ban only applied to third
934 party payments or those done -- prioritization done to benefit
935 an affiliate of the internet service provider.

936 So all kinds of applications could receive network
937 management. You mentioned specialized services and other kinds
938 of dedicated capacity. Those were fully allowed by the 2015 order
939 and, again, even when there is a use case for prioritization on
940 the open internet without going to a specialized service or

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941 dedicated capacity, there are protocols and methods for doing that
942 today.

943 They just simply don't require the edge provider to pay on
944 top of what the broadband user is already paying for their service.

945 Mr. Doyle. Right.

946 Mr. Wood, the ban on paid prioritization or pay to play, that
947 was a fundamental part of net neutrality and throughout the
948 proceeding to eliminate neutrality protections Chairman Pai
949 repeatedly said that the 2015 net neutrality order was a departure
950 from the past.

951 Yet, as far back as the 1970s the commission had identified
952 the potential harmful effects that could result when just a
953 handful of gatekeepers could control consumers' access to the
954 internet.

955 Has the internet always been open and free?

956 Mr. Wood. We certainly think so. In the old days, you might
957 call it, broadband providers were Title 2 providers. Your
958 dial-up service worked over a phone line and that phone company
959 was subject to nondiscrimination rules.

960 So although the legal ground for net neutrality has shifted
961 somewhat over the last decade as different administrations have
962 tried to do it in different ways, the protections have always been

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963 there and we think the 2015 version did the best job of restoring
964 the protections we've always had.

965 Mr. Doyle. So why were guardrails needed when the FCC opened
966 its proceeding that resulted in the recently overturned net
967 neutrality protection?

968 Mr. Wood. I am sorry. You said why were guardrails needed?

969 Mr. Doyle. Yes.

970 Mr. Wood. I am not sure I completely understand the
971 question. But we do think that restoring the protections --
972 keeping the protections we've always had was the right move. I
973 am not sure what guardrails you're referring to in the new
974 proceeding.

975 Mr. Doyle. No, in the recently overturned proceeding.

976 Mr. Wood. Yes. Well, I mean, again, these are fundamental
977 rights that we think deserve protection and always have had it
978 in some form or another and so that's why we are looking to restore
979 it now.

980 Mr. Doyle. I see my time has expired.

981 Thank you, Madam Chair.

982 Mrs. Blackburn. Gentleman yields back.

983 Mr. Shimkus, you're recognized for five minutes.

984 Mr. Shimkus. Thank you, Madam Chairman.

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985 Great hearing, interesting issue, contentious views. I
986 want to start with Mr. Schroeder and I want to, one, thank you
987 for being here, and secondly, I was watching your hands. Were
988 you reading Braille or how was -- how did you read to us your
989 testimony? What was going on down there?

990 Mr. Schroeder. Yes. Microphone -- is it on?

991 Mr. Shimkus. It's on. You're good.

992 Mr. Schroeder. Yes, I was. I am reading off of a small
993 Braille device. It's essentially a Braille computer that has my
994 summarized testimony.

995 Mr. Shimkus. Great. And where is the lady who's assisting
996 you through your glasses and the video? Where is actually she
997 physically located?

998 Mr. Schroeder. Amy is in San Diego currently.

999 Mr. Shimkus. Great. Great. So --

1000 Mr. Schroeder. I am taking the headphone out so she can talk
1001 if you have a question for her.

1002 Mr. Shimkus. I hope that you have a good working
1003 environment, Amy.

1004 [Laughter.]

1005 Mr. Schroeder. You know, one of the things we found when
1006 our agents -- and Amy was our lead agent and the person that

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1007 developed a lot of the training that the agents now go through
1008 -- she is a company employee in San Diego.

1009 But our agents love Aira, as you can imagine. They are paid,
1010 as I mentioned. It's largely home-based employment and as long
1011 as they've got a good internet connection they are able to provide
1012 the support for Aira users and there's a lot of satisfaction, I
1013 know, among our agents and the kind of work that they do from the
1014 tedious work of getting somebody through an airport or the very
1015 exciting work of actually being able to work with somebody who's
1016 touring Paris.

1017 Mr. Shimkus. Yes. In your testimony then -- you can put
1018 her -- you can put her down.

1019 [Laughter.]

1020 Mr. Shimkus. I don't think I've got questions for --

1021 Mr. Schroeder. I'm putting you down, Amy.

1022 Mr. Shimkus. Yes. In your testimony you talked about your
1023 relationship with AT&T and then the Aira accessibility of
1024 government buildings this week or while there are numerous people
1025 who have impaired vision that's on the Hill.

1026 And so it's tied into this hearing. Why do you think you
1027 were invited here to testify?

1028 Mr. Schroeder. I think Aira has an interesting case to make.

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1029 We've been clear from the beginning we don't really -- as you know
1030 if you looked at our company references, we don't really have --
1031 we haven't stated a position on this particular topic.

1032 But Aira has a very interesting case to make regarding
1033 prioritization and as I noted it's an upstream priority. So
1034 typically when we talk about this issue of prioritized content
1035 and access to content it's usually ensuring that users have access
1036 to content and the discussion tends to revolve around making sure
1037 that the content goes downstream in an orderly fashion.

1038 We are the other side of that case. We need to send video
1039 upstream and, as you know, you know, often upload speeds don't
1040 match download speeds.

1041 And so our critical case to make is that our service can't
1042 work if it's not -- if we don't have priority low latency access.
1043 I think we talk about 80 milliseconds is what we try to achieve
1044 or better of latency because if somebody is out and about moving
1045 they really do need that instant video feedback that the agent
1046 can then provide -- that that video in the opposite direction of
1047 what we usually talk about in these -- in these networking --

1048 Mr. Shimkus. Yes. It's excellent testimony and you can
1049 just see someone trying to cross a busy street and then being --
1050 feedback is delayed. That's a dangerous proposition to be -- to

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1051 be had.

1052 I just think it's -- it really does speak to -- it's not as
1053 simple as people like to portray this debate.

1054 And I want to go to Mr. Rysavy.

1055 Mr. Rysavy. Rysavy.

1056 Mr. Shimkus. Rysavy. You say it's not a zero sum game.

1057 Explain that. Because that's the whole debate. You know, net
1058 neutrality -- there's winners and losers -- Mr. Wood articulates
1059 that very -- but you say it's not. You can't put it in that --
1060 in that --

1061 Mr. Rysavy. It is absolutely not a zero sum game.

1062 Mr. Shimkus. And explain that.

1063 Mr. Rysavy. The reason is that different applications have
1064 different requirements. If I am trying to send a short message
1065 to an autonomous vehicle that there's a pedestrian in the road
1066 around the corner that the car can't see, that traffic does not
1067 have to adversely affect a video streaming application that
1068 already has a buffer and already has tolerance for delay in how
1069 it receives its packets.

1070 Mr. Shimkus. So and then someone else mentioned it's -- it's
1071 really not a highway. It's a network of networks.

1072 Mr. Rysavy. Yes.

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1073 Mr. Shimkus. And so there's other -- and Mr. Bennett, in
1074 your testimony you talk about how you can manipulate a portion
1075 of the network to actually slow up the process where the, quote,
1076 unquote, "pie" may get the original one.

1077 Great hearing, Madam Chairman. I wish I had more time but
1078 I don't, and I yield back.

1079 Mrs. Blackburn. The gentleman yields back.

1080 Let's see. So Ms. Eshoo, five minutes.

1081 Ms. Eshoo. Thank you, Madam Chairwoman.

1082 Again, thank you to the witnesses. I have to say that from
1083 the first three, I haven't heard any of you just clearly address
1084 why you think paid prioritization is a good idea.

1085 We just heard the exchange with Mr. Shimkus and the witness
1086 about different uses of the internet but it didn't have -- you
1087 didn't bring up why one case or another should have paid
1088 prioritization.

1089 So you know where I am but I think that your job is to try
1090 to dissuade me or bring new facts to the table and, most frankly,
1091 I didn't hear them.

1092 I think that paid prioritization really needs to be examined
1093 for exactly what it is. There are many uses on the internet.
1094 But, you know, I think that we are going to -- here at the committee

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1095 we have many members including myself that are fighting very hard
1096 for rural areas in our country to receive broadband. Some are
1097 underserved. Others are not served as they should be.

1098 Put paid prioritization on top of that. How fair is that
1099 to those people? You know, the idea is to move it faster, quicker,
1100 fairer, expand it so that there's more information to the many
1101 in a democracy.

1102 So to Mr. Wood, can you explain the distinction between --
1103 because this term is being thrown around -- specialized services
1104 and paid prioritization?

1105 And also, you refer to your, in your testimony, to new forms
1106 of discrimination and I think that that is -- you know, that could
1107 crop up and if you can expand on that a little I would appreciate
1108 it.

1109 Mr. Wood. Sure. Thank you, Congresswoman.

1110 Specialized services is a term that the FCC has used over
1111 the last several years. You might think of it as dedicated
1112 access. And so I don't know Aira's business model completely but
1113 a purchaser of a device might not actually be using that device
1114 on their own broadband network.

1115 The device might bring the broadband with it, if you will,
1116 and that's a way, if there is a need for prioritization and even

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1117 for the application waiver --

1118 Ms. Eshoo. And that was included in the 2015 rule, right?

1119 Mr. Wood. It was, and 2010 as well, and this is the kind
1120 of thing we've always seen with --

1121 Ms. Eshoo. And the court upheld that.

1122 Mr. Wood. That's true.

1123 Ms. Eshoo. Very importantly, the courts upheld that.

1124 Mm-hmm. I am sorry, go ahead.

1125 Mr. Wood. And then as to new forms of discrimination, we
1126 just believe that the kinds of things Chairman Blackburn was
1127 describing -- for example, distortion further into the network
1128 or especially at interconnection points, as they're called, where
1129 the last mile broadband network receives all this traffic that
1130 their users are subscribing for -- the users are requesting and
1131 if it can't get to them due to some sort of blockage further up
1132 the line or if there is some kind of new form of discriminatory
1133 treatment towards the broadband providers and users, we would like
1134 the FCC to have the ability to assess that and determine the
1135 statute is unreasonable discrimination to assess whether a tactic
1136 or a technique is actually benefiting users or hurting them.

1137 Ms. Eshoo. Is there anything that you know of that you can
1138 think of that makes the case for paid prioritization plausible

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1139 or acceptable?

1140 Mr. Wood. I mean, as I said, some people might postulate
1141 that it would save money for the broadband providers' customers.
1142 We just haven't seen that happen, and when you have so few choices
1143 among broadband providers --

1144 Ms. Eshoo. Well, how do you save money if you're paying
1145 more?

1146 Mr. Wood. Well, you wouldn't be saving money. I think that
1147 you know, sometimes there's a notion that if the edge provider
1148 pays the user won't have to, and what we think of this as is more
1149 double charging.

1150 The broadband provider's customer continues to pay for
1151 their access and then the two-sided market, or the handout in the
1152 other direction, says now the edge provider pays as well.

1153 So as I said, I don't think that the ISPs think of this as
1154 a way to save money.

1155 Ms. Eshoo. Yes, it's about as clear as fog. Yes.

1156 Well, I just -- I wish I heard a very clear case from the
1157 wonderful first three witnesses on why paid prioritization is a
1158 very good thing for anyone using the internet and I haven't heard
1159 it.

1160 I admire the different services that you have referred to

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1161 and all of that but I think that we've got some fog in this hearing
1162 and paid prioritization is paid prioritization.

1163 I don't find anything foundational and positive about it.

1164 Thank you to all of you, and I yield back.

1165 Mrs. Blackburn. The gentlelady yields back.

1166 Mr. Latta, you're recognized.

1167 Mr. Latta. Well, thank you very much, Madam Chair, and
1168 thanks for our witnesses. As my friend from Illinois said, this
1169 has been a very interesting hearing. I appreciate you all being
1170 here to give your testimony today.

1171 Mr. Bennett, if I could start my questioning with you. What
1172 are the impacts of traffic management on different applications?
1173 And if all video conferencing applications such as Skype or
1174 Facetime were in the same traffic lane as general email traffic,
1175 how would that impact each service?

1176 Mr. Bennett. Thank you for the question.

1177 Oh, speak into the machine. The network operators have to
1178 manage a pool of resources and one of the -- one of the resources
1179 that's really critical is what engineers call latency. It's
1180 delay. It's how long it takes a packet to get from one point to
1181 another.

1182 Latency is -- low latency is a resource that networks never

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1183 have an infinite supply of. There's -- it always has to be
1184 managed.

1185 So it's very important for these video conferencing apps to
1186 have low latency because if they don't the picture breaks up, the
1187 -- you hear, like, drop outs in the audio channel, and the overall
1188 accuracy and the feeling of sort of presence of being as if you're
1189 in the same room with the person you're talking to, you can't
1190 achieve that without very low latency.

1191 Latency doesn't make any difference to email applications.
1192 I mean, they're perfectly fine with, you know, and network time
1193 is like measured in units of, like, millionths and billionths of
1194 a second and email, you know, operates more at the level of, like,
1195 minutes and hours.

1196 So, I mean, it doesn't really matter. So when we -- when
1197 we assign, effectively, low latency to an email packet that
1198 doesn't need it simply because we are sending packets in the order
1199 they were received or in some other sort of semi random order,
1200 we are wasting a resource.

1201 And so it's actually -- I think it's a bit irresponsible to
1202 just sort of treat all traffic the same because that means we are
1203 ignoring the fundamental requirements that the users of those
1204 services have.

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1205 Mr. Latta. Thank you.

1206 Mr. Rysavy, if I could ask you -- in my district and across
1207 the country there's a great deal of interest in manufacturing and
1208 other sectors that we see increased efficiency from the Internet
1209 of Things.

1210 IOT will make -- will be name of next-generation sensors and
1211 automated equipment such as drones and robots that can provide
1212 real-time and HD video imaging, audio, and other
1213 bandwidth-intensive sensing, monitoring, automated processes.

1214 In a world without prioritization, can the Internet of Things
1215 become a reality?

1216 Mr. Rysavy. It would come to a very partial reality. The
1217 fact is that the application and quality of service requirements
1218 for different applications vary.

1219 So there may be some IOT applications that don't need
1220 prioritization. But to expand the number of applications to
1221 allow innovators the full range of everything that is possible,
1222 many of these techniques of quality of service management will
1223 be essential.

1224 Mr. Latta. Okay. Well, just a quick follow-up then, so
1225 what would that mean for overall U.S. competitiveness in
1226 manufacturing?

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1227 Mr. Rysavy. The more artificial restrictions that there are
1228 on what kind of applications can be deployed, the less competitive
1229 industry will be because you can be assured that other countries
1230 who wish to dominate in this space are not going to handicap their
1231 technologies.

1232 Mr. Latta. Okay.

1233 Mr. Bennett, going back, if I could, to you, we often hear
1234 about how ISPs prioritize packets that manage traffic congestion
1235 to complete a user-friendly experience.

1236 However, we see edge providers pay to prioritize search
1237 results, advertising social network feeds, shopping options, et
1238 cetera. Given that this form of paid prioritization is happening
1239 every day, I would like to understand the impact that it has on
1240 consumers.

1241 Mr. Bennett. Thanks for the questions.

1242 Yes, the -- we can see some of the impact of the
1243 prioritization of search results and how the market has changed
1244 for product search. For a very long time, Google was the dominant
1245 company in product search.

1246 But nowadays more people begin product searches on Amazon
1247 than do it in Google, and I don't know exactly why that is happening
1248 but I think it's something -- it has something to do with the fact

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1249 that when you do a Google search the first few answers you get
1250 are all paid ads, and they -- they're not always very relevant,
1251 you know, to what you're doing and they're certainly not as
1252 trustworthy as the organic search.

1253 So prioritization, I think, in that sense the company should
1254 realize that they've actually hurt their market position by
1255 distorting their search results that way and by the fact that the
1256 Google search is just not as effective as it used to be.

1257 Mr. Latta. Well, thank you very much.

1258 Madam Chair, my time has expired.

1259 Mrs. Blackburn. The gentleman yields back.

1260 Ms. Clarke, you're recognized for five minutes.

1261 Ms. Clarke. I thank you, Madam Chairwoman, and I thank our
1262 expert witnesses for their testimony here this morning.

1263 And given that I also serve on the Small Business Committee,
1264 I strongly believe and maintain that the rollback of net
1265 neutrality is going to have a hugely detrimental effect on small
1266 businesses, and I am not alone in this belief.

1267 Polling indicates that an overwhelming majority of
1268 respondents are concerned that the elimination of net neutrality
1269 could disadvantage small businesses by allowing big national
1270 chains to put their online services in a fast lane.

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1271 A number of small businesses in my district back in Brooklyn
1272 have been outspoken about this. Small businesses, like, take
1273 shape and staff base and I could co-sponsor the CRA to reinstate
1274 net neutrality in part due to their concerns.

1275 Given that, Madam Chairwoman, I would like to introduce a
1276 letter for the record and this record -- it opposes the FCC's
1277 rollback of net neutrality and it's signed by 800 small
1278 businesses.

1279 Mrs. Blackburn. Without objection.

1280 [The information follows:]

1281

1282 *****INSERT 6*****

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1283 Ms. Clarke. I thank you, Madam Chair.

1284 Mr. Wood, why are small businesses so concerned about the
1285 rollback of net neutrality and why is rolling back the ban on paid
1286 prioritization worrying these businesses?

1287 Mr. Wood. Thank you, Congresswoman.

1288 I think it's pretty clear and simple. They don't want to
1289 have to pay extra to deliver their content to their customers.

1290 Now, it's not true that they're not paying. They pay a lot
1291 to get their content onto the internet and they pay their own
1292 broadband provider or sometimes they're even able to build their
1293 own connections.

1294 What we are talking about here is then paying my ISP at home
1295 separate charge either to cut in line in front of somebody else
1296 or perhaps just to get the traffic to me in the first place and
1297 it's that extra and, frankly, new toll that I think has small
1298 businesses worried.

1299 I saw the poll that I think you're referring to and it was
1300 something like four to one small businesses opposed to the repeal
1301 and worried about paid priority.

1302 A large number of them are uncertain how it would affect their
1303 business so I find it funny that in the name of creating more
1304 certainty we've actually created great uncertainty for small

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1305 businesses who thought this was unsettled.

1306 But that's the kind of fear they're facing is are there going
1307 to be new tolls and new charges that I must pay just to get my
1308 content to my customers.

1309 Ms. Clarke. Very well.

1310 I've also been a small advocate of diversity in traditional
1311 media companies and that's why, along with my colleagues, I've
1312 created the Multicultural Media Caucus here in the House.

1313 The sad truth is that diverse voices are seldom truly
1314 represented in traditional media but that neutrality can in some
1315 ways help fix that problem.

1316 Mr. Wood, why is net neutrality important for groups that
1317 are not well represented in traditional media?

1318 Mr. Wood. Thank you, Congresswoman. I think it's for
1319 exactly that reason it does. It doesn't eliminate all barriers
1320 but it lowers the barriers to speaking in one's own voice and
1321 getting your story out there.

1322 And so traditionally communities of color have not been well
1323 represented on the airwaves. The internet helps to change that.

1324 Again, I think the notion that some who've tried to put
1325 forward in this hearing is that prioritization and paid
1326 prioritization could help them compete with the biggest content

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1327 providers, and I just can't see how that would work.

1328 I think if we did allow for paid prioritization then the
1329 traditional media companies would be the first in line and the
1330 highest bidders for such slots and that the less well known and
1331 well established media companies and voices would be pushed to
1332 the back of the line.

1333 Ms. Clarke. Very well, and I remain concerned about the
1334 impact paid prioritization can have on innovation and new ideas
1335 and on new products.

1336 When a programmer in my district comes up with the next big
1337 idea, how can we help ensure her focus is on connecting with her
1338 users? And this question is to Mr. Wood and Mr. Schroeder.

1339 Mr. Wood. I will go just because my mic's on.

1340 I think this is how we can do it is by preserving the internet
1341 as it always has been where people pay their own broadband
1342 connection but then they're not asked to pay an additional toll
1343 just to reach the other side of that connection and we have each
1344 side of the conversation paying for their connectivity but not
1345 this extra toll where the ISP charges in both directions.

1346 Mr. Schroeder. I think as -- thank you for the question,
1347 Congresswoman.

1348 I think for Aira we are a company that serves a rather small

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1349 and underserved customer base providing a unique service, right.
1350 So people who are blind or visually compared constitute, you know,
1351 maybe 23 million of the population.

1352 The people who need our service don't really have an adequate
1353 technology-based solution. What most people would do is try to
1354 find a sighted assistant to provide some access to visual
1355 information and there isn't always a sighted assistant around and,
1356 frankly, there isn't always a competent sighted assistant around
1357 to provide access to information.

1358 Getting to our users has been a real challenge. But to
1359 answer maybe the question you didn't ask but for us, one of the
1360 limitations we worry about is and one of the things we've seen
1361 before we had access to the dynamic traffic management that AT&T
1362 offers on its essentially high-priority private network is that
1363 our users were not able to get their video through in a -- in a
1364 way that was -- that actually worked because there were too many
1365 lags, too many delays, and too many dropped calls. And so they
1366 weren't able to have access to competent assistance using the Aira
1367 model.

1368 Ms. Clarke. I thank you, Mr. Schroeder, and I yield back,
1369 Madam Chair.

1370 Mrs. Blackburn. The gentlelady yields back.

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1371 Mr. Guthrie, five minutes.

1372 Mr. Guthrie. Thank you very much, Madam Chairwoman, and
1373 appreciate the hearing.

1374 And this question is for Mr. Bennett, probably continuing
1375 on some of the same theme. I would like to discuss the debate
1376 over ISPs taking advantage of their gatekeeper position at the
1377 last mile connection points by prioritizing content delivery for
1378 those who pay the most or even holding content hostage and the
1379 counter position that they wouldn't have a viable business model
1380 if they did this.

1381 I may be oversimplifying this but it seems to boil down to
1382 questions about relatively bargaining positions within edge
1383 providers and ISPs and who has the unique advantage in this regard.

1384 So the question, in the development of the internet as we
1385 know it today, has there been a need for or practice of paying
1386 for priority of content delivery over the last mile?

1387 Mr. Bennett. It certainly hasn't been a widespread
1388 practice, if it has existed at all. There have been certainly
1389 a lot of claims that ISPs were holding certain content providers
1390 hostage for payment.

1391 In 2014, Netflix accused the major ISPs of doing that to them
1392 but it turns out the network that was actually slowing their

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1393 traffic down was their transit provider, Cogent. The ISPs
1394 didn't really have anything to do with it.

1395 Mr. Guthrie. So if it exists, you don't know of it? Is that
1396 what you're saying?

1397 Mr. Bennett. It certainly hasn't been widespread. I mean,
1398 in fact, I would like to see more willingness on the part of ISPs
1399 to sell prioritized delivery to application providers that had
1400 real-time apps, you know, like video conferencing and they can't
1401 really -- have never really seen much reason how that would benefit
1402 them to sell that service because it would actually make third
1403 parties able to do -- you know, provide voice and face time just
1404 as well as the native products sold by the -- by the ISPs. This
1405 is especially the case at the wireless ISPs.

1406 Mr. Guthrie. So who has the stronger bargaining position
1407 over the last mile and what if ISP with less than a million
1408 customers dealing with an edge provider that has tens of millions
1409 of customers for their platform services?

1410 Mr. Bennett. Well, if -- the day an ISP announces that it's
1411 not going to allow Netflix to use its network because, you know,
1412 it has some dispute and it's not getting the money, that's the
1413 day -- pretty much the day that you should short that ISP as they're
1414 -- nobody has that kind of -- the bargaining position that Amazon

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1415 and Netflix and Google have.

1416 Those are regarded as essential services by users of ISPs.
1417 There's no way the ISP can mess with them.

1418 Mr. Guthrie. Because a lot of my ISPs at the last mile are
1419 local -- like, utilities, Bardstown City Cable is the ISP. Logan
1420 Telephone and Telegraph is the ISP for the last mile for a lot
1421 of the areas there that wouldn't have that kind of bargaining power
1422 that you're talking about.

1423 In your testimony also you say sharing is inherent in the
1424 internet's design and go on to say access to shared resources of
1425 any kind implies the development and implementation of the sharing
1426 policy.

1427 Can you elaborate on what options network operators have to
1428 manage shared access to a scarce resource? In particular, how
1429 does class of service or smart queuing techniques alleviate
1430 congestion when network load increases to moderate or high levels?

1431 Mr. Bennett. Well, the purpose of class of service or type
1432 of service in IP is to identify to -- for the application to
1433 identify -- tell the network what kind of service it needs, if
1434 it's a low precedence or whether their focus is capacity or
1435 reliability.

1436 The trouble with that is that typically -- and that's used

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1437 internally by ISPs once they're able to determine what application
1438 generated a particular traffic stream, which they can only do with
1439 -- they can do with a fair degree of accuracy but it's never going
1440 to be 100 percent, especially as new applications emerge that the
1441 ISP hadn't seen before and, like, how do I treat this -- do I treat
1442 it just like generic traffic and, you know, which is probably 95
1443 percent or it could be as much as 95 percent of the internet, or
1444 do I give it some sort of specialized treatment and the specialized
1445 treatment could be, like, it needs to be more urgently delivered
1446 than generic traffic but it also could be less.

1447 And so there's a case to be made for, like, actually -- if
1448 we can recognize the unique performance characteristics of
1449 different streams and then bargain appropriately, for some
1450 streams they're going to save money because if it's like a patch
1451 distribution or something that can happen at 3:00 o'clock in the
1452 morning, it's, you know, doesn't make sense for the ISP to charge
1453 a whole lot for that. In fact, it kind of makes sense to give
1454 it away for free because it makes the network work better if all
1455 the computers are patched and up to date.

1456 Mr. Guthrie. So who manages these techniques? I got about
1457 10 seconds.

1458 Mr. Bennett. Yes. They're managed by network operation

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1459 staff at the ISPs and the tricky part though is that the boundaries
1460 between different ISPs or different networks -- between an ISP
1461 and a transit network. And so they operate on the basis of
1462 agreements and they typically don't articulate the treatment of
1463 nonstandard --

1464 Mr. Guthrie. Thank you. My time has expired. I yield.

1465 Mrs. Blackburn. Mr. McNerney, you're recognized five
1466 minutes.

1467 Mr. McNerney. I thank the chair and I thank the witnesses.

1468 As an engineer, I am deeply concerned and troubled by the
1469 FCC's decision to repeal the ban on paid prioritization and kick
1470 the scraps of net neutrality over to the Federal Trade Commission.

1471 Mr. Wood, does the FTC have the resources to enforce net
1472 neutrality?

1473 Mr. Wood. Thank you, Congressman.

1474 To my knowledge, they do not. They have an enforcement
1475 geared staff and I think they do a good job but have trouble keeping
1476 up with the current caseload that they have, my understanding.

1477 Mr. McNerney. I've heard they don't have any network
1478 engineers. Is that right?

1479 Mr. Wood. That's what I've heard as well, yes, Congressman.

1480 Mr. McNerney. Well, I am concerned that without an expert

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1481 agency with network engineers on the case we might never know if
1482 there are violations of net neutralities.

1483 Back in 2007, we only discovered net neutrality violations
1484 due to the work of an engineer working at home on his own.

1485 Might this -- might it be difficult for the average consumer
1486 to recognize their broadband provider is violating net
1487 neutrality?

1488 Mr. Wood. Yes, Congressman, I think it could and in fact
1489 with nobody to watch over that process I do think that would be
1490 a problem.

1491 As we've heard, congestion can happen at different places
1492 in the internet and different parts of the network. The Netflix
1493 and Comcast disputes that Mr. Bennett referenced, a lot of people
1494 called their Comcast customer service representatives and said
1495 it's not coming through correctly and the first answer from the
1496 company was, "Maybe you should buy a faster speed tier," which
1497 wouldn't actually have solved the problem.

1498 So I think even the people who work in the network either
1499 for good faith reasons or marketing purposes might not be able
1500 to pinpoint where the problem is and then actually help the
1501 customer to solve it.

1502 Mr. McNerney. Thank you.

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1503 About veterans, in response to thousands of constituents who
1504 reached to me concerning their concerns about the elimination of
1505 net neutrality protections, I had a net neutrality town hall in
1506 my district to discuss their concerns.

1507 At the town hall, I heard from a veteran who was very worried
1508 about what this would mean for him and other veterans, including
1509 their access to health telenet services.

1510 Mr. Wood, given your experience with net neutrality, do you
1511 think veterans who need home telehealth services for in-home care
1512 should be concerned about the FCC's rollback of net neutrality?

1513 Mr. Wood. I do, Congressman.

1514 I think what they want is for the service to work and so as
1515 we've heard there could be different use cases, different types
1516 of prioritization that the network already does to make sure that
1517 all applications can reach their destination.

1518 What I think veterans are worried about overseas is, I am
1519 already pay for my connection, which might be difficult to manage
1520 overseas -- my family is paying at home -- is there going to be
1521 a news hole or a new kind of charge to make sure that traffic can
1522 actually reach his destination, and I think that's where the
1523 concern comes from that this will be a new fee that's ultimately
1524 passed on to customers, even if it's the edge provider who is

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1525 paying it in the first place.

1526 Mr. McNerney. Mr. Schroeder, do you have similar concerns
1527 about access with net neutrality protections disappearing?

1528 Mr. Schroeder. For the purposes of Aira's technology,
1529 again, we are concerned that we have access to a cell network that
1530 can deliver our video upstream in a way that is reliable.

1531 I don't know that the end of the open internet order would
1532 adversely or would have changed our business model significantly
1533 if -- whether or not that order was in place.

1534 I do think it is critical that we ensure that our veterans
1535 have access to the kind of service that Aira is providing and I
1536 would say that, given the relatively underserved group that we
1537 are reaching out to, my sense is that that's not a group that
1538 probably gets priority under any structure.

1539 And so without a company like Aira really pushing that issue
1540 and, in our case, having a good partner with AT&T in order to allow
1541 us to use a priority network, I am not sure that that service would
1542 be provided -- our business model and our service would be provided
1543 in a way that actually works for people in the real world as we
1544 have to make it work.

1545 Mr. McNerney. Has Aira come out in favor of the -- Mr.
1546 Doyle's CRA?

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1547 Mr. Schroeder. We have not taken a position on any of the
1548 bills.

1549 Mr. McNerney. You referred to low latency several times in
1550 your testimony. Can you explain what that means?

1551 Mr. Schroeder. Yes. Low latency means a very -- a
1552 connection with no delays or minimal delays. And so in our case,
1553 as we said, our video needs to be able to move through at, you
1554 know, what we've estimated currently ideally for Mbps.

1555 We think, with the new glasses that I am wearing -- these
1556 are called Horizon -- by the way, they're actually made almost
1557 entirely in San Diego so it's all U.S.-based, we are proud to say
1558 -- that we may even need a little bit higher bandwidth in order
1559 to ensure that the quality of the video that these glasses are
1560 able to provide gets through.

1561 And the comment about busy streets and crossing streets,
1562 while Aira makes clear that we do not provide information to
1563 somebody in the midst of a street crossing because we want them
1564 to use their other skills, we do note that people need information
1565 very rapidly and very immediately including out on the street in
1566 order to avoid obstacles.

1567 Mr. McNerney. Okay. Thank you.

1568 I yield back.

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1569 Mrs. Blackburn. The gentleman yields back.

1570 Mr. Olson.

1571 Mr. Olson. I thank the chair. Welcome to our four
1572 witnesses.

1573 This question is for the entire panel. Just go from your
1574 right to left. Just gives your thoughts on prioritization.

1575 My hometown of Houston Texas was hit by Hurricane Harvey
1576 really hard this past August -- hit us not once, hit us twice.
1577 Some parts of my district had 50 inches of rain -- almost five
1578 feet of rain -- in two days.

1579 The amazing efforts of the Houston law and local first
1580 responders before, during, and after Hurricane Harvey saved
1581 thousands of lives.

1582 With prioritization, isn't that important for our first
1583 responders? Shouldn't their traffic be prioritized in times of
1584 emergency?

1585 Mr. Bennett.

1586 Mr. Bennett. Yes, Congressman Olson, it certainly should.
1587 As part of the -- and as a former Houstonian who lived through
1588 Carla, quite sensitive to, you know, what went on down there
1589 recently.

1590 FirstNet is primarily -- it's sort of the value proposition

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1591 for FirstNet other than interoperability between first responders
1592 is the ability to get, what do they call it, prioritized quality
1593 -- preemption and priority.

1594 It's quality, preemption, and priority, so that first
1595 responders not only can get a connection during a -- during times
1596 of emergency, civilians want to use the networks and, you know,
1597 call people and let them -- let them know they're okay or they're
1598 not okay and call for help and all that. So there's a lot of
1599 pressure on the networks from facilities being down and high usage
1600 and so but, you know, we definitely want first responders to have
1601 priority access.

1602 Mr. Olson. Mr. Rysavy, your comments on priority access
1603 during times of natural disaster like Hurricane Harvey.

1604 Mr. Rysavy. Thank you, Congressman, for the question.

1605 Yes, absolutely, that's a perfect example of a situation
1606 where certain users such as the first responders do need access.
1607 But it's just an example of many because from there you might
1608 consider a surgeon doing remote surgery -- they might need
1609 prioritization as well. Thank you.

1610 Mr. Olson. Mr. Schroeder.

1611 Mr. Schroeder. I think emergencies provide two interesting
1612 examples of why Aira is so critical and why making sure that our

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1613 information is getting through.

1614 The first one is a lot of the information that is provided
1615 during an emergency is inherently visual. There's maps and
1616 charts and graphics on television screens that indicate where one
1617 is supposed to go, what the storm pattern is, that sort of thing.

1618 Without access to Aira, it is very difficult for a person
1619 to get that information in a reliable sense. When somebody is
1620 relocated, you can imagine a person who's blind. They're in an
1621 usually setting. Having access to Aira and a reliable visual
1622 assistant will allow that person to have better access to the
1623 shelter and have, of course, a better experience.

1624 Somebody might say that that's perhaps not critical. I
1625 would disagree. I think if somebody has relocated who's blind
1626 or visually impaired they certainly need to be able to access the
1627 information around them successfully just like anybody else who's
1628 been relocated to that area and Aira, having a -- ensuring that
1629 our video gets through, is another way that that person is able
1630 to have the information about where they are as well as things
1631 that they need to know related to surviving that emergency.

1632 Mr. Olson. Amen.

1633 Mr. Wood, your comments on prioritization during natural
1634 disasters.

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1635 Mr. Wood. Certainly. Thank you, Congressman.

1636 Yes, first responders deserve priority during disasters. I
1637 would say that was fully permitted under the 2015 rules that have
1638 now been repealed.

1639 And the last thing I would want is paid prioritization for
1640 first responders. I can't imagine having the ambulance or the
1641 fire department pay an additional toll on their way to the
1642 emergency.

1643 So I think that draws out the distinction we are talking about
1644 here.

1645 Mr. Olson. Good point.

1646 The final question for you, Mr. Bennett. Your testimony
1647 discussed internet optimization, and as you're well aware, we are
1648 at the beginning of a huge data boom, another massive data boom.

1649 Could you elaborate on possible tools that could be used in
1650 the future to help further efficiencies, to optimize the internet
1651 traffic, and also what role does AI play in the future?

1652 Mr. Bennett. AI is going to be essential, I think, to
1653 identifying traffic streams and mapping them to applications and
1654 determining what kind of service they need.

1655 It's something that -- the capability to do that has sort
1656 of increased an awful lot in network routers over the years and

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1657 -- well, it's sort of hard to draw the line between sort of better
1658 programming and AI.

1659 I mean, it definitely leans toward the side of AI, the kind
1660 of intelligence that networks have to have these days.

1661 Mr. Olson. My time has expired.

1662 I yield back. Thank you.

1663 Mrs. Blackburn. The gentleman yields back.

1664 Mr. Engel, five minutes.

1665 Mr. Engel. Thank you, Madam Chair and Ranking Member.

1666 When Mark Zuckerberg was before our committee last week, one
1667 of the things I asked him was about foreign influence on our
1668 democracy.

1669 In the FCC's docket that rolled back the ban on paid
1670 prioritization and the other net neutrality protections,
1671 Americans' identities were stolen and used to comment in support
1672 of Chairman Pai's role back of net neutrality.

1673 It seems like another attempt at sowing division.

1674 Mr. Wood, have you received any of these fake comments filed
1675 in the FCC's docket?

1676 Mr. Wood. Thank you, Congressman.

1677 Have I seen them? Is that the question?

1678 Mr. Engel. Yes.

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1679 Mr. Wood. I have seen some sampling of the 24 million
1680 comments, yes, and I know that there have been allegations about
1681 fake comments coming from foreign sources and from all sides.

1682 Mr. Engel. Do you think the FCC has done enough to address
1683 the fake comments in the record?

1684 Mr. Wood. No, I certainly don't. In fact, the attorney
1685 general of New York has tried to launch an investigation on behalf
1686 of New York State residents whose identities were stolen and
1687 inappropriately used in the proceeding.

1688 And I think it's fair to say the answer they've gotten from
1689 the FCC has been something of a shoulder shrug to this point. So
1690 I don't think the FCC has either used all of its own tools or
1691 cooperated strongly enough with other law enforcement agencies
1692 who want to look into this.

1693 Mr. Engel. What else should they have done?

1694 Mr. Wood. Well, I mean, I think it's a good question. We
1695 want to have maximum participation in these public decision making
1696 processes.

1697 So I don't know if there's much they could have done to stop
1698 the inflow of any fake or fraudulent comments. I've heard that
1699 even several members of Congress had their names used, including
1700 their street addresses. So it wasn't just a matter of filling

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1701 in a fake name.

1702 I don't know what more they could have done at the beginning.
1703 But I do think they should have paused and considered what to do
1704 about the bad comments flowing into the record during the process
1705 and then maybe should have taken longer to consider what to do
1706 with them before voting.

1707 Mr. Engel. Would you anticipate legal challenges to the
1708 FCC's order repealing net neutrality based on the fake comments?

1709 Mr. Wood. Well, we have actually filed suit. Something
1710 like 23 attorneys general, a dozen or more public interest
1711 organizations like ours, and internet companies as well, and also
1712 some local -- for example, Santa Clara County and the California
1713 Public Utilities Commission.

1714 I think that will be part of the case. I can't tell you
1715 how much it will be part of the arguments or the judge's response
1716 to it.

1717 Mr. Engel. Mr. Wood, let me stick with you.

1718 You testified that getting rid of paid prioritization would
1719 radically change the internet. You said that the ban only
1720 prevented ISPs from favouring traffic in exchange for payments
1721 from third parties or to benefit an ISP's affiliated video or voice
1722 offers. But it did not ban user-directed traffic.

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1723 So can you expand on that and explain a little more about
1724 how user directed traffic works?

1725 Mr. Wood. Certainly. I hope so. The internet protocols
1726 that already manage these kinds of different needs for different
1727 types of applications that goes on today. I think all the
1728 witnesses have spoken about it to some degree, and that kind of
1729 process was not prohibited by the paid prioritization ban.

1730 All that the rule prohibited was having an edge provider or
1731 some other third party come in and try to alter that natural
1732 balancing that goes on.

1733 If the balancing couldn't happen in what I would call a
1734 neutral fashion with the protocols just deciding which
1735 applications need priority at that particular point in time, then
1736 the user could also pay their broadband provider and we have more
1737 comfort with that because then the internet user remains in
1738 control of how their connection is being used, so which content
1739 they can get and also which type of application and services they
1740 might need to or choose to prioritize at a particular point in
1741 the day.

1742 Mr. Engel. Okay. Well, thank you very much.

1743 Thank you, Madam Chair. I yield back.

1744 Mrs. Blackburn. The gentleman yields back.

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1745 Mr. Bilirakis, five minutes.

1746 Mr. Bilirakis. Thank you, Madam Chair. Appreciate it.

1747 I thank the -- I want to thank the panel for their testimony
1748 as well.

1749 Mr. Schroeder, as stated in your testimony, the speed of your
1750 service is near instantaneous, and when you discuss how the
1751 service is used not only for work-related tasks but helping people
1752 navigate city streets, speed is, clearly, a requirement. Isn't
1753 that the case?

1754 Mr. Schroeder. Yes, Congressman Bilirakis.

1755 Mr. Bilirakis. It seems your partnership with AT&T is
1756 central to your service. Isn't that the case?

1757 Mr. Schroeder. It is a very important element, yes.

1758 Mr. Bilirakis. Can you describe how the user experience
1759 would be different if Aira did not have this partnership and had
1760 to compete equally with all other internet traffic?

1761 Mr. Schroeder. I can, because we rolled out the relationship
1762 with AT&T's Dynamic Traffic Management Network over the -- about
1763 over the last four to six months.

1764 Prior to that time, we got many complaints from our users
1765 and I am an Aira user myself and I also experienced many dropped
1766 calls, many significant delays in video, many instances where we

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1767 had an audio connection with the agent but no video and they did
1768 their best using GPS and other sensor data that we were able to
1769 get upstream. But the lag in video created not only trouble for
1770 our business model, because we are a service that people subscribe
1771 to, but more important created challenges for people who are blind
1772 who in the midst of needing a sign read to them, needing to make
1773 a decision about which direction to go, needing to find that last
1774 -- we often -- you talk about the last mile. We often talk about
1775 the last 20 feet, trying to find the right door. And oftentimes
1776 that's when the video would, unfortunately, kick out and so just
1777 when you needed the information most.

1778 So we -- I know and I know our users experience what the
1779 network situation was like before we had access to a priority
1780 network and it was -- it was not a good experience.

1781 Mr. Bilirakis. So you just described the latency
1782 consequences?

1783 Mr. Schroeder. That's correct.

1784 Mr. Bilirakis. Yes. Okay. Very good. Thank you.

1785 Next question -- as a relatively new company, did you find
1786 it difficult to get a partner that would provide the
1787 prioritization services that your company needs to operate?

1788 Mr. Schroeder. You know, sometimes I am a little bit

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1789 embarrassed. Aira gets a lot of attention. I think a lot of
1790 people find what we do to be quite remarkable and quite amazing.

1791 We actually had no trouble finding interest among carriers
1792 to work with Aira and to allow us to or to encourage us to work
1793 with their cell networks.

1794 AT&T was the company that came through with the best
1795 partnership and really showed the most interest in giving us
1796 opportunity to work with their priority network as well as, as
1797 I mentioned in my testimony, providing support for getting Aira
1798 into the hands of college students and in working with us in
1799 designing some of the technology that we are using, for example,
1800 to get access to prescription medication, which is one of the
1801 highest use cases that our Aira users often need to ensure that
1802 they're taking the right medicine.

1803 Mr. Bilirakis. That's great.

1804 I want to commend you for working with our veterans as
1805 customers but also as employees. But I also want to give you an
1806 opportunity because I do have some time to describe how Aira works
1807 and how beneficial it is to your customers, if you please. And
1808 so if you can elaborate a little bit more on it because it is
1809 fascinating and it improves a person's quality of life.

1810 Mr. Schroeder. Thank you for that, Congressman Bilirakis.

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1811 We -- and I appreciate your support as well. We do -- we have
1812 so many wonderful stories from our Aira users who use the service,
1813 of course, in critical ways like navigating the Boston Marathon,
1814 which trying to move among runners, as you can imagine, is a very
1815 dicey proposition, especially in the weather conditions they had
1816 yesterday, and it speaks to the need for having a very strong
1817 network with low latency available to them.

1818 We've also had individuals who have spent a few hours working
1819 with an agent putting IKEA furniture together, and I don't know
1820 if I should mention a specific company. But I think we all know
1821 how challenging following some of those visual directions if you
1822 can see can be.

1823 Many of our users have found Aira to be extraordinarily
1824 helpful in navigating technology. There's a lot of great
1825 technology, such as what I am using here with this Braille device
1826 that makes information available to blind people. But it
1827 sometimes doesn't work. It sometimes breaks down, and when it
1828 breaks down we are suddenly -- we are confronted with a blank
1829 screen -- blank to us because we can't see it -- and being able
1830 to quickly grab an Aira agent via the smart glasses and application
1831 allows us to have access to what is on that screen so we can
1832 hopefully save our work and be able to continue to be productive.

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1833 Oftentimes in the past -- I know the time is up -- but often
1834 time in the past it would take several minutes or maybe hours to
1835 find somebody sighted to come and help figure out what was on that
1836 computer screen. Now we've got that instantaneous with Aira.

1837 Mr. Bilirakis. Well, thank you very much. And I know it's
1838 very beneficial to our constituents. I appreciate it, and I yield
1839 back, Madam Chair.

1840 Mrs. Blackburn. The gentleman yields back. Mr. Flores.

1841 Mr. Flores. Thank you, Madam Chair.

1842 Madam Chair, I would ask to enter into the record a article
1843 written today by Roslyn Layton of AEI that's called
1844 "Prioritization: Moving Past Prejudice to Make the Internet
1845 Policy Based on Fact."

1846 Mrs. Blackburn. Without objection.

1847 [The information follows:]

1848

1849 *****COMMITTEE INSERT 7*****

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1850 Mr. Flores. Thank you.

1851 Mr. Bennett, talking about 5G for a minute, the next leap
1852 in technology for wireless, does China have a ban on pay
1853 prioritization?

1854 Mr. Bennett. Not as far as I know. The telecom carriers
1855 in China are state-owned enterprises.

1856 Mr. Flores. Right.

1857 Mr. Bennett. And they're pretty much able to --

1858 Mr. Flores. How about Japan?

1859 Mr. Bennett. Japan I don't think -- I don't think it does.

1860 Mr. Flores. They don't? And South Korea? Do they have a
1861 ban on pay prioritization?

1862 Mr. Bennett. No, definitely not. South Korea offers all
1863 kinds of gradations of internet.

1864 Mr. Flores. So we talked about discrimination against rural
1865 communities. Let's assume this fact pattern for a minute. You
1866 have got an ISP that has an internet pipe going into a rural
1867 community.

1868 That rural pipe drives or carries the traffic for a new 5G
1869 network that we have in that rural community but that it's a
1870 limited size pipe.

1871 So you're going to have 5G traffic. You're going to have

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1872 RS traffic going over it. You're going to have FirstNet going
1873 over it, hospitals, schools, and then on a Saturday night 80
1874 percent of the traffic is going to be coming through because of
1875 video.

1876 What happens -- if you don't have paid prioritization what
1877 happens to everybody's traffic under that scenario?

1878 Mr. Bennett. Well, if you don't prioritize then what
1879 happens is when network load increases and latency increases and
1880 it's sort of every app is affected to some degree, and the more
1881 sensitive apps are affected more seriously.

1882 Mr. Flores. Okay.

1883 Mr. Bennett. So I think one -- one of the implications is
1884 that for rural users is if you can't get consistently low latency
1885 for Skype, then you're going to have to keep on paying for an old
1886 timey telephone connection because your Skype is just never going
1887 to be reliable.

1888 Mr. Flores. And Mr. Schroeder, what would that do to your
1889 Aira users if you're in that community without a paid -- again,
1890 there's no paid prioritization.

1891 Mr. Schroeder. Yes. We do have users in the rural areas
1892 and there is often a struggle to ensure that we've got good network
1893 access for those individuals. That is something that we

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1894 certainly look forward to further network development.

1895 Mr. Flores. And so Mr. Woods talked a lot about
1896 discrimination against different populations that because of a
1897 paid prioritization. It sounds to me like the opposite is true.

1898 If you have a ban on paid prioritization, it would
1899 discriminate against your population of sight limited and also
1900 veterans. Does that make sense?

1901 Mr. Schroeder. We don't know --

1902 Mr. Flores. Again, using the same example.

1903 Mr. Schroeder. Congressman, we don't know whether that's
1904 true or not. But we suspect -- what we do know is that having
1905 access to a reliable network is critical and in this case we are
1906 able to use a priority network for that purpose. So that is
1907 helping.

1908 Mr. Flores. Okay. And so but if you didn't have access to
1909 that paid priority network then you wouldn't be able to have that
1910 service with the low latency?

1911 Mr. Schroeder. Our service certainly suffered prior to that
1912 access.

1913 Mr. Flores. Okay.

1914 Mr. Bennett, in order to offset that -- again, you have got
1915 this community, it's got a new 5G network, it's got limited

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1916 last-mile capability -- who pays to expand the capacity?

1917 Mr. Bennett. In the absence of anyone else coming up with
1918 the desire to do that, it's going to be the carrier.

1919 Mr. Flores. Okay. And so then --

1920 Mr. Bennett. Who is going to pass the cost on to the
1921 consumer.

1922 Mr. Flores. Right. So essentially, every -- if you don't
1923 have paid prioritization then everybody pays to offset the latency
1924 issues that are introduced because of a ban on pay prioritization.
1925 Is that correct?

1926 Mr. Bennett. Absolutely, just as today the people who don't
1927 use Netflix pay for the capacity upgrades that enable others to
1928 use Netflix.

1929 Mr. Flores. Okay. So, again, the cost is being socialized
1930 for the people that want to use lots of band width across the entire
1931 population, even those who don't use the band width.

1932 That doesn't sound fair to me. I mean, we have a population
1933 that pays for priority TSA pre-check, pays for toll lanes, pays
1934 to use UPS instead of the mail service or pays for priority mail.

1935 It seems to me like folks ought to pay for their fair share.

1936 Madam Chairman, I yield back the balance of my time. Thank
1937 you.

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1938 Mrs. Blackburn. The gentleman yields back.

1939 Mrs. Brooks, you're recognized five minutes.

1940 Mrs. Brooks. Thank you, Madam Chair.

1941 I would like to just clear up and make sure we are all on
1942 the same page relative to FirstNet -- FirstNet, obviously, being
1943 the network that has been created most recently to ensure the
1944 public safety has the ability to communicate and gets priority
1945 in the case of emergencies and disasters and is now just beginning
1946 to be built out across the country and so forth.

1947 But there a ban on paid prioritization involving FirstNet,
1948 is there not? I am a little bit confused.

1949 Mr. Bennett.

1950 Mr. Bennett. There's not. FirstNet is a separate -- is a
1951 special purpose network that's separate from the regular or is
1952 sort of a supplement to the regular mobile network.

1953 But the preemption of the or the relocation of the old Title
1954 2 regulations by -- that were enacted by Chairman Wheeler means
1955 that there is no ban on paid prioritization for anyone.

1956 Mrs. Brooks. Okay. And so how is it that we can ensure that
1957 FirstNet, for instance, will receive that priority in the -- in
1958 an instance of a disaster?

1959 Mr. Bennett. Well, FirstNet is designed to do that. So if

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1960 it doesn't do that then it's failed to meet its primary goal, which
1961 is quality, preemption, and prioritization.

1962 So the -- but the thing that worries me about FirstNet is
1963 because it does so many things that fall outside the realm of what
1964 the traditional net neutrality advocates have demanded.

1965 What's to prevent one of them, Mr. Wood's organization or
1966 some similar organization, from simply filing a suit against
1967 FirstNet for violating net neutrality?

1968 Mrs. Brooks. Mr. Wood, you brought this up a little bit.
1969 Can you please comment on this? Because I do want to make sure
1970 that we all are on the same page when it comes to the importance
1971 in the preemption of FirstNet.

1972 Can you please comment?

1973 Mr. Wood. Certainly, Congresswoman.

1974 I think my earlier answer was that yes, emergency services
1975 deserve priority. They could have had that under the rules that
1976 have now been repealed.

1977 Mr. Bennett is correct that they don't face any such rules
1978 today because there are no rules in place at the moment, or at
1979 least there won't be when the rule changes take effect here in
1980 the next few weeks.

1981 But, again, I think what we keep missing is the distinction

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1982 prioritization and paid prioritization. And so, again, the last
1983 thing I would want is for first responders to have to pay to
1984 prioritize their traffic during times of emergency. They were
1985 able to prioritize for any kind of public safety or emergency use
1986 case under the old rules and I think that's what should continue
1987 now.

1988 Mrs. Brooks. But that's not being contemplated right now,
1989 is it?

1990 Mr. Wood. I think what's being contemplated is FirstNet is
1991 actually designed to be a prioritized network for first responders
1992 and that would not have violated the 2015 rules that have now been
1993 repealed. It's not a violation of anything now. It's nothing
1994 that we would fight against.

1995 We have three lawyers, so we are not really in the business
1996 of filing more lawsuits than we need to.

1997 Mrs. Brooks. Okay. So you have no plans on filing any
1998 lawsuits?

1999 Mr. Wood. Certainly not.

2000 Mrs. Brooks. Okay.

2001 Mr. Bennett. Could I --

2002 Mrs. Brooks. Yes, Mr. Bennett.

2003 Mr. Bennett. Can I add something to that?

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2004 Mrs. Brooks. Yes.

2005 Mr. Bennett. Mr. Wood says that paid prioritization is not
2006 part of FirstNet. But first responders pay to be part of
2007 FirstNet.

2008 They pay to use -- it's not a free service, right. It's --
2009 so it's partially paid for by the -- by fees that states and
2010 municipalities give up to be part of that network. And so then
2011 once they've paid those fees then they get all the prioritization
2012 they need.

2013 Mrs. Brooks. So how will a ban on paid prioritization
2014 implicate FirstNet, Mr. Bennett?

2015 Mr. Bennett. I am not sure that it would for the use of the
2016 primary channel. But first responders -- FirstNet is designed
2017 actually use band width that's available over regular commercial
2018 networks as well when -- you know, when it needs to.

2019 And so I think there are -- there could be scenarios in that
2020 secondary usage of the other channels that could subject FirstNet,
2021 certainly, to a challenge.

2022 Mrs. Brooks. Very briefly, Mr. Rysavy, shifting gears a
2023 minute, can you comment on how 5G will inherently prioritize
2024 traffic to handle a wider range of applications than 4G?

2025 Mr. Rysavy. Thank you for the question, Congresswoman.

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2026 5G is being designed with a very sophisticated quality of
2027 service architecture with which traffic flows can be managed not
2028 only for priority but also for latency, possibility of packet
2029 laws, guaranteed band width and so forth. So you really need to
2030 manage all of those aspects to be able to provide services example
2031 the type of performance that they need.

2032 Mrs. Brooks. Thank you. My time is up. I yield back.

2033 Mrs. Blackburn. Gentlelady yields back.

2034 Mr. Doyle just told me that baseball players get priority.

2035 [Laughter.]

2036 Mrs. Blackburn. And so he favors priority.

2037 Mr. Doyle. Good ones. Good ones that are on the committee.

2038 Mrs. Blackburn. So you are -- you're recognized.

2039 Mr. Ruiz. Given that I am the only other Democratic member
2040 here and that I've had my share of splinters collected, sitting
2041 on the bench, I appreciate that, Coach Doyle.

2042 Thank you. As a physician I think we have obligation to make
2043 sure that we are using the internet and technology to help improve
2044 the public's health.

2045 The FCC's 2015 net neutrality protections actually came up
2046 with a very targeted way to ensure specialized services like
2047 telehealth and public safety technology are allowed to thrive.

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2048 But I am concerned that the current FCC has done the opposite
2049 by abandoning any protections that prohibit big corporations from
2050 paying for their services to be prioritized over these telehealth
2051 type services.

2052 So with that in mind, I would like to introduce a letter for
2053 the record from the American Medical Informatics Association that
2054 expresses these concerns.

2055 Mrs. Blackburn. Without objection.

2056 [The information follows:]

2057

2058 *****INSERT 8*****

2059 Mr. Ruiz. So my question -- my first question is for Mr.
2060 Wood. It's very simple. Is there anything in the FCC's most
2061 recent net neutrality order that will ensure guarantee hospitals,
2062 community health clinics, and local police departments won't just
2063 get pushed into slower lanes because they can't afford to bid
2064 against the big mega corporations down the road?

2065 Mr. Wood. Thank you, Congressman.

2066 Not to my knowledge. I know that the current order basically
2067 took away all of the traffic management rules and guidelines and
2068 left it to the ISPs. It has some transparency obligations that
2069 they face but nothing that would speak to their ability to either

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2070 charge for priority or not.

2071 Mr. Ruiz. Yes. So there are no safeguards to guarantee
2072 that these vital public health services are protected and not
2073 marginalized profit motive?

2074 Mr. Wood. That's right. To my knowledge, there are no
2075 safeguards and basically this FCC has washed its hand of the
2076 business and said that they are not going to have any rules
2077 whatsoever when it comes to what ISPs try to prioritize or not.

2078 Mr. Ruiz. Okay. And what would you do to ensure those
2079 safeguards?

2080 Mr. Wood. Well, we have supported the Congressional Review
2081 Act resolution of this approval to restore the 2015 order. We
2082 feel it's important to restore the entirety of the rules that were
2083 lost but also the FCC's ability to investigate if something like
2084 that were to occur. So sometimes this is talked about in a
2085 competition framework and that matters.

2086 But we would certainly want to FCC to have the ability to
2087 investigate if it were a certain kind of telemedicine or health
2088 application being discriminated against even if that were not to
2089 favor another telemedicine application but simply were a bad
2090 choice made by the cable or phone company.

2091 Mr. Ruiz. Okay. And as a lawyer that follows net

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2092 neutrality closely, can you explain what it means that the FCC's
2093 originally net neutrality protections treated telehealth as a
2094 specialized service? What does that mean?

2095 Mr. Wood. Well, it means that they were allowed to be
2096 treated as specialized services. I would note that I think many
2097 telehealth applications can and do run over the open internet.

2098 So it's not the case that every health application or every
2099 medicine application even has to be treated as a specialized
2100 service.

2101 I don't know if the word has a lot of meaning for folks. I
2102 sometimes think of it as dedicated capacity. And so if you have
2103 an application that does not suit -- does not fit well on the open
2104 internet, it needs additional protections, then it could be
2105 treated as a specialized service, again, usually paid for by the
2106 person who has the arrangement with the ISP.

2107 So not necessarily this additional kind of toll where they're
2108 paying twice, both for their own connectivity and for priority
2109 in the last mile but simply arranging their own kind of delivery
2110 privately.

2111 Mr. Ruiz. One of the biggest challenges that we have is in
2112 rural America where you don't have population centers that can
2113 access the infrastructure for broadband and other things even for

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2114 commercial use. These are exactly the locations where we want
2115 to promote telehealth because they need access to doctors and
2116 health care services.

2117 Do you think it's a valid concern that without the strong
2118 net neutrality protections we might undermine innovation in the
2119 medical space and elsewhere?

2120 Mr. Wood. I do, Congressman.

2121 I think that the genius of the internet has been that
2122 application makes can come up with their ideas and not have to
2123 pay an additional toll to bring them to market or to get them
2124 through that last mile to the user.

2125 And so when you do have a small ISP -- I have the same
2126 concerns, not just that the small ISP might serve as a bottleneck
2127 but if they were really were at a bargaining disadvantage with
2128 the biggest edge providers, then perhaps that content would be
2129 prioritized rather than the small application makers or
2130 innovators.

2131 Mr. Ruiz. We are starting to see a lot of tech medicine type
2132 opportunities for people in rural areas that haven't been served
2133 for mental health services.

2134 And so now you're seeing folks on their phones or their pads,
2135 their computers being able to actually have counselling for the

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2136 first time and be connected with other addiction services groups
2137 to provide social support networks to get the care that they need.

2138 And so I am just concerned that this is going to inhibit that
2139 progress that is being made out there.

2140 Thank you very much.

2141 Mrs. Blackburn. The gentleman yields back.

2142 Mr. Johnson, five minutes.

2143 Mr. Johnson. Thank you, Madam Chair, and thank you,
2144 gentlemen, for joining our panel today.

2145 Mr. Schroeder, a lot of parties paying attention to this
2146 hearing have pushed the idea that we don't need to worry about
2147 whether an application like Aira could avoid a paid prioritization
2148 ban in the future since past net neutrality attempts have always
2149 included an exception for specialized services.

2150 Setting aside the problem that past performance does not
2151 predict future results, that is actually incorrect. The 2015
2152 open internet order specifically rejected the, quote,
2153 "specialized services," unquote, carve out, providing instead an
2154 exception for services that are not broadband internet access
2155 service unless they service that as not broadband internet access
2156 service as provided in a manner that undermines the purpose of
2157 the open internet rules.

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2158 Now, do you understand what that means? Because nobody
2159 else understands what that means.

2160 Mr. Schroeder. No, Congressman. The way you phrased it I
2161 can't untangle that thicket.

2162 Mr. Johnson. Yes. Well, nobody else can either. So Mr.
2163 Rysavy, your thoughts on this -- would that definition give you
2164 any confidence that some of these services we are talking about
2165 would meet the FCC's approval?

2166 Mr. Rysavy. Congressman, thank you for asking.

2167 No, not at all. The exception for specialized services is
2168 ill defined and certainly does not foster innovation or any
2169 confidence in moving forward with such applications.

2170 Mr. Johnson. All right. Well, thank you.

2171 You know, the devil is in the details. This is one we need
2172 to make sure we get right or a paid prioritization restriction
2173 could do some real harm.

2174 Mr. Wood, moving on to you, you seem to indicate in your
2175 testimony that broadband was considered a Title 2 service until
2176 the Bush FCC tinkered with its classifications.

2177 What you didn't mention, though, was that the Obama FCC
2178 agreed with that classification of broadband as an information
2179 service and left it there in its first attempt at net neutrality

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2180 rules in 2010 and even the 2015 open internet order acknowledged
2181 the long track record here.

2182 It spelled out all the history and tied the determination
2183 that broadband was an information service all the way back to the
2184 computer inquiries that the FCC had decided over 50 years ago.

2185 The commission was very specific that it was changing its
2186 mind and disavowing all the previous precedent to reclassify
2187 broadband into a Title 2 telecommunication service.

2188 So do you disagree with the determination by Chairman Wheeler
2189 that before 2015 broadband had always been an information service?

2190 Mr. Wood. I don't know that he said it precisely that way
2191 but I do disagree with that phrasing.

2192 Before 2015, you mentioned the first Obama administration
2193 attempted at neutrality rules. Like the rules that were adopted
2194 at the tail end of the Bush administration, those were struck down
2195 in court. So there's a reason that we went back to the drawing
2196 board and talked about it again.

2197 The dispute here is not so much whether broadband was an
2198 information service but whether internet access was and there are
2199 two parts of that. There's the connection that gets you online.
2200 Then there's the service or the content you interact with once
2201 you're there.

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2202 So there has been some historical dispute about whether
2203 something like AOL, for example, was an information service. I
2204 would say that it was. It was allowing you to browse the internet,
2205 but only once you got to that site using your phone connection.

2206 And what we say is that from -- really, before 2002 all
2207 internet access, that physical connection was Title 2. The FCC
2208 started to change that and said that access over a cable line could
2209 be considered an information service and that's when the attempts
2210 to prevent discrimination on those lines started to fall down in
2211 court. So that's why the FCC returned to what we see as the
2212 rightful legal definition.

2213 Mr. Johnson. Got you. Okay.

2214 Mr. Bennett, most of us subscribe to mass market retail
2215 broadband. This means that rather than each of us having a
2216 dedicated pipe to just our home, we are sharing bandwidth with
2217 all of our neighbours who also subscribe to that same service.

2218 So if everyone on my street is streaming videos in the evening
2219 to broadband speeds, I am getting might be slower than I would
2220 experience at another time when not as many users are on the
2221 connection.

2222 So here's my question to you. What happens if there's an
2223 emergency that I need to call 911 on my voice over IP-enabled

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2224 phone?

2225 Since that call goes over my broadband connection at some
2226 point, will it also be caught up in that video congestion? Will
2227 my 911 call be degraded so someone can watch a cat video?

2228 Mr. Bennett. The short answer is yes.

2229 Mr. Johnson. Okay. That's about all I can ask for.

2230 Madam Chair, I yield back.

2231 Mrs. Blackburn. The gentleman yields back.

2232 Mrs. Walters, five minutes.

2233 Mrs. Walters. Thank you, Madam Chair, and thank you,
2234 witnesses, for being here.

2235 When talking to my constituents back home about tech issues,
2236 one of the questions I've been asked is how prioritization could
2237 impact them.

2238 I know some of my colleagues have covered a couple of these
2239 issues but I would like to ask a few questions that some of my
2240 constituents have been asking me.

2241 One thing that comes up is the issue of degradation and
2242 internet traffic management. Some people have expressed
2243 concerns that prioritizing certain traffic over other degrades
2244 the traffic that is not prioritized.

2245 Mr. Bennett, in your testimony you mentioned the

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2246 differentiated treatment of internet traffic report which, quote,
2247 "demonstrates that traffic differentiation is not a zero sum
2248 game."

2249 Could you explain what that means for the average internet
2250 consumer?

2251 Mr. Bennett. Yes, I can.

2252 I was a member of the committee that wrote that report. The
2253 point is that because applications are not all created equal, a
2254 sort of a theoretical or a literal degradation of a pack of --
2255 an individual piece of information by a millionth of a second or
2256 so may qualify in a legal sense as a degradation.

2257 It's not a degradation that the consumer will perceive. And
2258 so given that we are placing so much importance on polling and,
2259 you know, which is sort of a question of measuring perception,
2260 the question is whether there's a perceptible degradation and in
2261 that sense prioritization is certainly provably empirically
2262 without a doubt unquestionably not a zero sum game.

2263 Mrs. Walters. Okay. Thank you.

2264 And Mr. Rysavy, in your testimony you talked about network
2265 slicing and its relationship to quality of service management.
2266 Can you explain the concept of network slicing in layman's terms
2267 and how it affects the average consumer?

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2268 Mr. Rysavy. Network slicing -- thank you, Congresswoman,
2269 for the question.

2270 Network slicing is an architectural aspect of 5G.
2271 Basically, it's a way that the network will present different
2272 faces for different usages.

2273 So, in theory, an operator could develop a slice for
2274 autonomous vehicles, another slice for a factory automation, and
2275 so forth, and each of these will require a very specific quality
2276 of service requirements among which traffic prioritization is
2277 essential.

2278 What it translates to the user is that with network slicing
2279 they will see a wide range of new innovative services coming to
2280 market.

2281 Mrs. Walters. Thank you.

2282 And throughout this hearing, there's been a discussion about
2283 the different forms of prioritization and I think we can all agree
2284 that there are instances where certain traffic has to be
2285 prioritized over others, like the example that we've been hearing
2286 a lot lately is prioritizing 911 call over a cat video.

2287 Mr. Bennett, can you talk about types of bad prioritization
2288 including types we should actively prevent?

2289 Mr. Bennett. You know, I think any sort of negative

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2290 prioritization that's intended to impair the performance of a
2291 competitive product to the carrier is something that should be
2292 looked at with suspicion. But I think it's sort of covered under
2293 general antitrust law.

2294 I am not a lawyer like Mr. Wood is so I can't really justify
2295 that. But it's my sense the way it's been explained to me that
2296 the violations that we are concerned about are essentially already
2297 prohibited under sort of the general laws of regulating business
2298 in the U.S.

2299 Mrs. Walters. Mr. Wood, would you want to add anything to
2300 that?

2301 Mr. Wood. I could. I think the antitrust could be a remedy
2302 for some competitors, say, if Comcast decided to block Netflix.
2303 I don't think it would be a very useful remedy in all instances,
2304 especially if there were smaller video providers who were
2305 suffering from that kind of blockage or deprioritization and I
2306 think all we have to do is look at cable TV where when you don't
2307 have some kind of common carrier mantra and framework.

2308 You know, cable TV is not illegal under the antitrust
2309 standards. Cable providers do pick and choose which content to
2310 show you.

2311 The question is should we have no safeguards whatsoever and

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2312 make the internet more like cable TV or should we have the same
2313 kind of two-way open transmission network we've had that lets
2314 people go to any site of their choosing.

2315 Mrs. Walters. And what should Congress consider doing to
2316 prevent these types of prioritization activities from occurring?
2317 And Mr. Bennett and then Mr. Wood, if you'd like to join in.

2318 Mr. Bennett. I would rather that Congress adopt a generally
2319 permissive attitude like there's been so much demonization and
2320 so much sort of emotional rhetoric and spin and framing in this
2321 discussion that I think we've just sort of -- we've gone way
2322 overboard on the side of caution.

2323 So let's let a few things happen. Let's allow some
2324 experiments like Aira to take place and examine the marketplace
2325 and then if something is going on then step in and correct, but
2326 preemptively allow people to innovate.

2327 Mrs. Walters. My time is up.

2328 Mrs. Blackburn. The gentlelady yields back.

2329 Mr. Costello for five minutes.

2330 Mr. Costello. Thank you.

2331 Mr. Rysavy, I enjoyed reading your testimony --

2332 Mr. Rysavy. Thank you.

2333 Mr. Costello. -- and found it very helpful. I want to cite

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2334 something and ask you this question. Mission critical use case
2335 model type analysis that you provided, you speak -- you state,
2336 "This category of 5G application will depend on the ability to
2337 deploy traffic prioritization."

2338 Can you just briefly explain why prioritization will be
2339 necessary for 5g? Is it necessary and, if so, why?

2340 Mr. Rysavy. Thank you for the question, Congressman.

2341 Yes, prioritization is an absolutely essential aspect of 5G
2342 in enabling new use cases. The whole motivation for investing
2343 hundreds of billions of dollars in 5G networks is to expand what
2344 can be done with wireless technologies and being able to support
2345 mission critical applications is going to be a great expansion
2346 of capabilities compared to 4G.

2347 Mr. Costello. And along that line, and I think the
2348 terminology here -- I think everybody supports net neutrality,
2349 broadly speaking -- certain types of paid prioritization I think
2350 obviously do fall under FTC and are anti-competitive.

2351 When you speak about prioritization here, what you're
2352 speaking about is organizing slices based on the type of data and
2353 what it's used for. Is that correct?

2354 Mr. Rysavy. That is correct.

2355 Mr. Costello. Is there a better for you to -- would you

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2356 embellish on that if need be or was that --

2357 Mr. Rysavy. No, the whole -- the whole point is to recognize
2358 that different types of applications have different requirements.
2359 Some may need very high band width but can drop a lot of packets
2360 because it doesn't -- it won't impact the user experience. Others
2361 might be very low band width but the reliability of information
2362 carried might be absolutely crucial.

2363 Mr. Costello. You go on to say, "But unprioritized and
2364 competing with other traffic the latency can be 10 times higher,
2365 for example," and then you go on. And what you're saying there,
2366 I believe, is that if we don't have prioritization that you will
2367 end up across the board generalized with slower data getting to
2368 -- from point A to point B. Is that correct?

2369 Mr. Rysavy. Yes. The point I am making is that if you have
2370 to treat every packet equally that you will end up degrading the
2371 average quality of experience across the base of applications.

2372 Essentially, prioritization is an extremely powerful tool
2373 for network management and to ban it really undermines the value
2374 of these networks, moving into the future.

2375 Mr. Costello. Mr. Wood, what's your response to that?

2376 Mr. Wood. My button won't work.

2377 I think it's just where we began, Congressman -- that we

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2378 haven't called for a ban on prioritization done in a neutral
2379 fashion to make sure that applications work. We've called for
2380 a ban and the rules had a ban on paid prioritization, meaning that
2381 the edge provider, the app maker, whomever we want to think --

2382 Mr. Costello. The one you have the content associated with
2383 it. But don't you agree that the FTC already has jurisdiction
2384 over that and is able to enforce?

2385 Mr. Wood. Well, the FTC might have jurisdiction or DOJ might
2386 if we could make it come to --

2387 Mr. Costello. Well, they do or they don't, don't they?

2388 Mr. Wood. Well, they have jurisdiction over certain kinds
2389 of anti-competitive conduct. They don't have jurisdiction if my
2390 own home connection is suffering because I can't reach the
2391 content that I want, and I am focused on the internet user, not
2392 just this battle between Comcast and Netflix or any other two large
2393 providers.

2394 Mr. Costello. Isn't in the interest of the company to make
2395 sure that the user does have access?

2396 Mr. Wood. Well, I think what we are talking about today
2397 though shows that there are use cases for prioritization. So they
2398 have general interest in making sure that content is available
2399 but that they might then pick and choose which content is available

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2400 at which terms for people who pay more.

2401 Mr. Costello. I had another question. This is tangential.
2402 I apologize. But the fake comments -- what is your -- I mean,
2403 what is a fake comment?

2404 Mr. Wood. Well, I think there are different kinds. One
2405 could describe as less valuable. We certainly think the petition
2406 --

2407 Mr. Costello. But doesn't the FCC able to sift through that
2408 and determine what's valuable and what isn't?

2409 Mr. Wood. Well, I think they said they are not going to
2410 decide what is fake and what isn't. So, to me, something that
2411 is obviously fake or fraudulent is somebody using --

2412 Mr. Costello. But what's fake?

2413 Mr. Wood. Somebody using somebody's else identification
2414 and name and address to put a comment in.

2415 Mr. Costello. But the content, it's -- isn't it about the
2416 content and not who says it?

2417 Mr. Wood. Well, I do think people have a right to not have
2418 things said in their name. So if somebody put a comment in for
2419 you supporting Title 2 you might care.

2420 Mr. Costello. People say that I -- fair point. But
2421 ultimately though the FCC would be looking at the content of the

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2422 content, not who said it. Wouldn't that be accurate?

2423 Mr. Wood. I would hope they would look at the content but
2424 I think it matters who said it too because people have a right
2425 to speak in their own name and not have others speak for them or
2426 pretend to speak for them.

2427 Mr. Costello. But the FCC wouldn't decide something one way
2428 or the other just because a specific person said it or didn't say
2429 it. Wouldn't that be correct?

2430 Mr. Wood. That's right, and I think that they still have
2431 an obligation to make sure their record isn't tainted by people
2432 basically engaging in identity theft in order to make comments
2433 that are not actually their own.

2434 Mr. Costello. Sometimes I -- we probably wish people
2435 wouldn't taint our comments, too.

2436 Okay. Thank you. I yield back.

2437 Mrs. Blackburn. The gentleman yields back.

2438 Seeing that there are no further members --

2439 Mr. Doyle. Madam Chair?

2440 Mrs. Blackburn. Yes, sir.

2441 Mr. Doyle. Can I ask unanimous consent in addition to the
2442 letters from pediatricians, telehealth experts, small
2443 businesses, and others supporting a ban of paid prioritization,

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2444 I have one additional letter from the Consumers Union that I would
2445 like to introduce onto the record.

2446 Mrs. Blackburn. Without objection.

2447 [The information follows:]

2448

2449 *****INSERT 9*****

This is a preliminary, unedited transcript. The statements within may be inaccurate, incomplete, or misattributed to the speaker. A link to the final, official transcript will be posted on the Committee's website as soon as it is available.

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2450 Mr. Doyle. Thank you.

2451 Mrs. Blackburn. Yes. You all have been gracious with your
2452 time and with getting your testimony in.

2453 Before we conclude I do want to submit for the record and
2454 ask unanimous consent to do so tweets of Cloudflare CEO Matthew
2455 Prince, a report by Richard Bennett, "Designed for Change," a
2456 report by BTAG, Daniel Lyon's article, your comments, Mr. Rysavy,
2457 a report by Mr. Rysavy, "How Wireless is Different" and an article
2458 by George Ford.

2459 [The information follows:]

2460

2461 *****INSERT 10*****

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2462 Mrs. Blackburn. I will remind our members that pursuant to
2463 committee rules they have 10 days to submit questions in writing
2464 to you and you all will have 10 days in which to respond.

2465 There being no further business to come before the committee,
2466 we are adjourned.

2467 [Whereupon, at 12:26 p.m., the subcommittee was adjourned.]

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