

**PROTECTING COMPETITION AND
INNOVATION IN HOME TECHNOLOGIES**

HEARING
BEFORE THE
SUBCOMMITTEE ON COMPETITION POLICY,
ANTITRUST, AND CONSUMER RIGHTS
OF THE
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UNITED STATES SENATE
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PROTECTING COMPETITION AND INNOVATION IN HOME TECHNOLOGIES

TUESDAY, JUNE 15, 2021

UNITED STATES SENATE,
SUBCOMMITTEE ON COMPETITION POLICY,
ANTITRUST, AND CONSUMER RIGHTS,
COMMITTEE ON THE JUDICIARY,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:44 p.m., in Room 226, Dirksen Senate Office Building, Hon. Amy Klobuchar, Chair of the Subcommittee, presiding.

Present: Senators Klobuchar [presiding], Blumenthal, Ossoff, Lee, and Hawley.

OPENING STATEMENT OF HON. AMY KLOBUCHAR, A U.S. SENATOR FROM THE STATE OF MINNESOTA

Chair KLOBUCHAR. I call this hearing of the Subcommittee on Competition Policy, Antitrust, and Consumer Rights on Protecting Innovation and Consumer Choice in Home Technologies to order.

Good afternoon. Welcome to our witnesses. This hearing continues Senator Lee, and my, and our Committee Members' bipartisan review of America's monopoly problem; and I thank Senator Lee and his staff for working with our staff to plan this hearing.

The Competition Policy Subcommittee has been examining the problems that arise when a handful of companies become powerful enough to distort competition in the marketplace. So far, we've seen that excessive market power benefits a few companies able to wield it at the expense of consumers, businesses, and workers. Our current antitrust laws have not been effective in stemming the rise of monopoly power or its abuse by dominate companies. As a result, we see competition problems in industry after industry across our economy.

Today, we'll examine an emerging industry that could fall prey to the same dynamic: connected home technology. Millions of Americans already have connected devices in their homes, including speakers, smart television, systems to control lighting or temperature within the home. I just, Senator Lee, used my own remote vacuum cleaner just the other day to scare my daughter as she was watching TV.

[Laughter]

Chair KLOBUCHAR. It wasn't a big deal, but I could just do it. We are just at the beginning. These technologies will continue to develop for things like connected refrigerators and washing machines.

In the years to come, they will play an even larger role in our lives. Many people are understandably excited about these technologies. I like them, but we must get ahead of this. So many of the things we talk about when we are in this room when it comes to antitrust, or over in the House, are looking back at things that should have been done differently, privacy rules, doing more when it comes to apps, doing more when it comes to what some of these acquisitions were. I'll just use the examples of Instagram and WhatsApp. At the time, people didn't see ahead.

We have this moment with this kind of technology to look around the corner and to see ahead. As we're looking at bills, Senator Lee just introduced a bill with Senator Grassley. I have a bill with several Members of this Subcommittee. We have tech bills that we're all working on over here. We have to think of these bills in the context of what's happening in this area as well, given this incredible movement and growth that we're seeing.

In home technology, we see some of the most powerful firms that dominate tech today, poised to dominate the platforms of the future. We hear concerns about Amazon's and Google's growing market power with connected speakers. Over 50 percent for Amazon; 30 percent for Google. We're also hearing concerns about use of consumer's personal information. That would be privacy. Of course, privacy legislation on the Federal level has somehow alluded us. Most would be handled in the Commerce Committee, but that's the other piece of this puzzle in addition to the work that needs to be done on antitrust.

Americans are counting on us to protect innovation and competition. To go over the stats, 94 million people in the U.S. own at least one connected speaker which they can use to play music, ask about the weather, and tell their kids to come down for dinner. In the years to come, connected devices in our home will become even more sophisticated. These devices work with each other through technology interfaces. Often digital voice assistants like Alexa.

I want to highlight a few key concerns that we will explore at the hearing today. First, many consumers use their connected speakers to operate other connected devices, like asking the digital assistant to lower the thermostat by 2 degrees. They should get the very best at digital voice assistance available, whether that is Amazon's Alexa, Google's Assistant, or a new entrant. Will Amazon and Google use their market power to block that new digital voice assistant from being installed on the connected speakers that are already in consumers' homes? Or will they let competition flourish, even if it threatens their dominance?

Second, in a few years, people might easily have 20 or more connected devices in their home, from a vacuum and a fridge to speakers and lights. We want those devices to work with each other seamlessly. In other words, they need to interoperate. You shouldn't have to choose the right devices for your home based on whether they play nicely with Google or Amazon's digital assistants, or whether Google or Amazon has locked them into an exclusive contract.

We have seen what happens when the largest and most powerful tech companies make their own decisions about interoperability. They embrace it as long as it helps their bottom line. When inter-

operability threatens their own products and services, they change their tune and start boxing out competitors. This has a real potential harm both to competition and innovation.

Third, concern about self-preferencing. The market leaders benefit from having their services preinstalled because many customers never change the default settings. Maybe I know a little bit about that. Imagine a household with a connected refrigerator that automatically replenishes the supply of certain groceries. Do we want Amazon to set Whole Foods or Amazon Fresh, the grocery store it owns, as the only place to purchase these groceries? Absolutely not. Consumers should choose, not vertically integrated tech giants.

Finally, I have concerns, as I mentioned, about privacy. Connected devices can make our lives easier and more efficient, but that should not come at the cost of basic privacy rights. Digital voice assistants could collect data from multiple connected devices in the home, giving already data-rich companies even more insight into who visits us, or lives in our home, what we listen to, what we say to each other, what foods we eat, how often we do our laundry, and how well we sleep at night. That highly personal and sensitive information must not be aggregated and auctioned off to the highest bidder. That data is ours.

Given these problems facing the connected home industry, we need to act now to protect competition, innovation, and consumer. Step one is to give our antitrust enforcers the resources they need to do their jobs. We took a big step with the bill we passed out of this Committee; Senator Grassley and my bill to change the merger fees, filing structure that has now just passed the Senate as part of a major bill in the last week. That bill is now going over to the House. We have every reason to believe it will pass. And then we have to look through the appropriations and budget process for more resources.

Secondly, updating our antitrust laws, as I mentioned, we all have some good ideas on that front, but that has to be a part of the solution.

Third, Federal privacy legislation.

Let me be clear, this isn't about punishing success or going after companies just because they are growing. This is about learning from what we have seen in the recent past. Instead of just complaining about it after the fact, we have a chance to include what we know about this market as we look at legislation and enforcement actions going forward.

I want to thank you so much, and I turn it over to Senator Lee.

**OPENING STATEMENT OF HON. MICHAEL S. LEE,
A U.S. SENATOR FROM THE STATE OF UTAH**

Senator LEE. Thanks so much, Madam Chair. Thanks for convening this hearing. This is one that I'm looking forward to. I think it raises some very significant and interesting questions.

First, it raises the question about—by the way, I like the idea of the vacuum being used to scare intruders.

[Laughter.]

Senator LEE. That's truly multi-tasking—

Chair KLOBUCHAR. That would be my daughter that I did it to. Yes. Go ahead. Go ahead.

Senator LEE. One of the questions it raises is whether smart home devices will just provide for one more way for Big Tech firms to expand their already significant market power. Google and Apple have duopoly control over smartphone operating systems that smart home devices frequently need access to or compatibility with, at a minimum, in order for them to be successful.

Google dominates online advertising, which relies on the kind of data that smart home devices may be uniquely in a position to collect. Amazon is the leading online retailer, and a major Cloud service provider at the same time. Competing smart home devices will inevitably encounter Amazon just by trying to host their service and selling their products.

Second, setting aside specific antitrust concerns for just a moment, why on earth would we want to give Big Tech even more control and more influence over our daily lives? They already control how we find information on the internet, and they influence what products we buy, and how we buy them. They sell the data collected on us every day and hold the keys to monetization for an ever-growing array of small businesses. We already know that they don't always exercise this power in the best interest of society. As they branch into newer areas, obviously that raises some concerns.

Big Tech repeatedly silences political and religious views from the heartland of America. It makes their left coast and liberal employee base uncomfortable. They've censored criticism of progressives. They've protected their favorite political candidates and hidden scientific information that undercuts whatever happens to be their preferred narrative on any of a host of issues from day to day. Big Tech has even deplatformed a sitting President. If you dare to actually try to build your own platform, like Parlor did, they'll pull the plug on that too. Big Tech already controls nearly everything we do online. Are we now willing, for the sake of some minor convenience, to give them control over our homes as well? Forget the Government in your bedroom. I don't even want tech in my kitchen. Surely, we already know enough to know that this isn't going to end well.

Finally, as a consumer and as a father, I sometimes wonder whether in the aggregate the conveniences of Big Tech's smart home scheme outweigh the negative affects on us as a society. Do we really need WiFi on an oven? Or on a light switch? If we can't even get off the couch to turn on the lights or check on dinner, how will we muster the energy to spend quality time with our families? Meaningfully engage with our neighbors and participate in self-governance? I have no doubt that Big Tech will be happy to handle things like that for us as well.

All these questions call for close scrutiny, both during this hearing and by consumers as they consider purchasing these products. Protecting competition will be more important than ever. It's one thing to deal with a monopolist in commerce, but try dealing with one when you're cooking too.

I look forward to this hearing, and hearing from our witnesses, and how we can avoid past mistakes and ensure competitive markets in smart home devices, hopefully to ensure that they neither

serve to augment Big Tech's market power nor undermine the fabric of society as a whole.

Thank you, Madam Chair.

Chair KLOBUCHAR. Thank you much. I am now going to introduce our witnesses.

Ryan McCrate is the vice president and associate general counsel for Alexa and Echo at Amazon, where he leads the legal team supporting Amazon's Alexa voice service and Echo family of devices. Ryan joined Amazon in 2007, and has supported a variety of other Amazon services. Before that, he practiced law at Kirkland and Ellis.

Wilson White is a senior director on the government affairs and public policy team at Google, where he leads policy efforts for our connected devices and Android operating systems. Before joining Google's public policy team, he was a patent litigation attorney at Google, where he not only defended Google in patent infringement lawsuits, but also pushed for patent reform legislation. Prior to joining Google, he was an associate at a law firm in Atlanta.

Eddie Lazarus is the chief legal officer at Sonos. He leads the company's legal corporate governance, SEC reporting, government affairs, regulatory and compliance activities. Previously, he was the general counsel and chief strategy officer for Tribune Media Company and also served as the Chief of Staff to the Chairman of the FDC—I'm sorry, FCC, from 2009 to 2012.

Matt Crawford is a senior fellow at the University of Virginia's Institute for Advanced Studies in Culture and New York Times best-selling author. His books have been translated into 13 languages. How many book languages was your book translated into, Senator Lee? Okay. It's one. He holds a PhD in political philosophy from the University of Chicago, which is where I went to law school.

Jonathan Zittrain is a professor of law and of computer science at Harvard. He is also a cofounder of the Burkman Cline Center for Internet and Society.

With that, if the witnesses could please stand and raise your right hand.

[Witnesses are sworn in.]

Chair KLOBUCHAR. Thank you. You may be seated. I will now recognize the witnesses for 5 minutes of testimony each. I would also note, Senator Lee, that Lina Kahn was just named the Chair of the FTC, an interesting development from an antitrust standpoint. With that, I will turn it over to Mr. McCrate, if you would like to proceed.

[Pause.]

Chair KLOBUCHAR. Mr. McCrate, I know you're remote—there you are. Oops. We can't hear you. Let's try this again.

[Pause.]

Chair KLOBUCHAR. Do you want to—

Mr. McCrate. Sorry. It looks like—

Chair KLOBUCHAR. Okay. Do you want to start now? Start over?

Okay. It's not working again. Do you want to go to—maybe us? It may be on our side. Do you want to go to Mr. Wilson first, and then we'll go to Mr. McCrate?

Mr. WHITE. Do you hear me? Okay, Senator?

Chair KLOBUCHAR. Yes. I can hear you.

Mr. WHITE. Okay. I'll get started.

Chair KLOBUCHAR. Okay. Mr. Wilson, thank you. Welcome back.

**STATEMENT OF WILSON WHITE, SENIOR
DIRECTOR PUBLIC POLICY & GOVERNMENT
RELATIONS, GOOGLE INC., MOUNTAIN VIEW, CA**

Mr. WHITE. Thank you, Chairman Klobuchar, Ranking Member Lee, and distinguished Senators of the Subcommittee. Thank you for the opportunity to appear before you again today.

My name is Wilson White. I'm a senior director on the government affairs and public policy team at Google, where I lead our policy efforts for connected devices and the Android operating system.

Increasing access to the benefits of technology is what motivates me to come to work every day. At Google, our goal is to be helpful to people in moments that matter, including when you're trying to scare your daughter with a remote vacuum. It's in those moments that technology can truly improve peoples' lives.

I think of a Google Pixel user named Chris. Chris was a passenger in a car that was suddenly struck by a truck traveling at high speed through a poorly marked three-way intersection. Stunned by the impact, with the smell of burning rubber in the air, Chris panicked. Disoriented and unsure what to do, he felt his Pixel phone vibrating. The phone had detected that Chris may have been in a car accident, and it was prompting him to dial 911 so that he and his family could quickly get the life-saving help that they needed the most. To us, this is what it means for connected devices and services to help in moments that matter. That a phone can tell you that you might need emergency help shows just how far we've come, and it's just a taste of the innovations that lie ahead.

A few decades ago, most Americans were fortunate if they had a single computer at home, and even luckier if that computer could access the internet. Today, most Americans have a supercomputer in their pocket. Access to the internet on desktop devices paved the way for the explosion of innovation and economic growth that we saw in mobile. We're witnessing the dawn of a new era of computing beyond the mobile phone, where there will be more and more opportunities to integrate the benefits of technology into a diverse set of devices and services.

Technology is helpful only where it can be easily accessed. Making technology more accessible across a broad range of devices is what's driving innovation in the connected devices space. At Google, we believe the future of connected devices will make people safer, will help them in their daily lives, and will help businesses more efficient and productive. We're proud to play a role in spurring innovation in this fast-moving, hyper-competitive, but nascent space.

We've always believed that open platforms enable competition, which is the best way to put great services in the hands of users at the lowest cost. It's in that spirit that we've pushed for openness across the broad range of connected devices.

Back in 2019, we joined with others to stand up an independent working group focused on building an open connectivity standard

that would allow devices to work with each other across a broad range of smart home ecosystems. Open standards foster competition by leveling the playing field for smaller players and new entrants, simplifying product development, and increasing choice for consumers.

The working group has come a long way. Last month, it announced an interoperable secure connectivity standard for the future of the smart home called MATTER. We're committed to implementing this new protocol in Android and across a range of Nest products, making these devices more open, more customizable.

Connected devices show incredible potential to help consumers in the moments that matter and in ways that were unimaginable a few decades ago when Americans got the first taste of having computing in their home. We've come a long way since then, but we're still in the very earliest days of an exciting period of growth, competition, and innovation.

Much of our discussion today will focus on the competitive efforts and the innovative efforts of some of America's most successful technology companies, including ours. America's success in the years ahead isn't guaranteed. Competition is fierce in this space, and American companies face stiff competition from companies around the world. Preserving America's global technological leadership in a field that has the potential to define the future of how people integrate technology in their lives will take a collective commitment to innovation, investments in technological advancements, and getting the right pro-competitive, pro-consumer, policies in place so that this verging sector can thrive. It's for that reason that we're grateful for the opportunity to participate in this discussion.

We look forward to a continued engagement with this Subcommittee and others in Congress on these important issues, and I look forward to answering your questions.

Thank you.

[The prepared statement of Mr. White appears as a submission for the record.]

Chair KLOBUCHAR. Thank you very much. Thank you. Are we okay with Mr. McCrate coming up now?

Thanks. Mr. McCrate.

Mr. McCrate [continuing]. And Members of this—

Chair KLOBUCHAR. Yep. I hear your voice.

Mr. McCrate. Okay. You can hear me now? Great.

Chair KLOBUCHAR. I think we need to get a little louder. I do hear you, though.

Mr. McCrate. Okay.

Chair KLOBUCHAR. I see you. Nice background.

Mr. McCrate. All right.

Chair KLOBUCHAR. Perfect.

Mr. McCrate. Is it coming through now?

Chair KLOBUCHAR. Okay. We're not going to make any assisted speaker jokes or anything. We're all good. Okay. Go ahead.

**STATEMENT OF RYAN McCARTE, VICE PRESIDENT
AND ASSOCIATE GENERAL COUNSEL, AMAZON, SEATTLE, WA**

Mr. McCrate. All right. Thank you, Chairman Klobuchar, Ranking Member Lee, and Members of the Subcommittee. I am Ryan

McCrate vice president and associate general counsel for Alexa at Amazon.

Amazon's invention of the Echo smart speaker and our investment to develop Alexa have meaningfully increased competition in the voice assistant and smart home space. Increased customer choice provided a new channel for customers to reach online services and created significant new growth opportunities for third-party manufacturers.

When we set out to build Echo and Alexa 10 years ago, we took our inspirations from the Star Trek computer. A service that would allow customers to access the power of the internet just by using their voice. It took us longer than we expected to build Alexa, and it required us to invent our way through many previously unsolved technical problems, and to invent new ways to preserve and protect customer privacy. We are incredibly proud of the success of Echo and Alexa, and we work to constantly improve them because we know customers have other options.

Alexa is not the most widely used voice assistant. Google Assistant and Apple's Siri are both used by many more customers. The truth is that most voice assistant usage occurs on mobile phones, and nearly all smartphones sold in the U.S. today are Google phones or Apple phones, which come with their assistants.

With Echo and Alexa, we gave customers a new way to access voice, one that wasn't controlled by the operating system on their phone. The options for customers only continue to grow. While building a new voice service was very hard when we started 10 years ago, it is much easier to get started today. The state of voice science has advanced rapidly, and many of the core building blocks for a voice service can now be licensed off the shelf or accessed through Cloud services offered by Amazon, Microsoft, IBM, Google, Nuance, or others. As a result, there are many companies that have or are developing their assistants, including Samsung, Facebook, Comcast, LG, SoundHound, and Spotify. Voice assistants are now available through a wide range of devices, such as smart TVs, laptops, tablets, set-top boxes, and even thermostats.

As the number of voice assistants grows, we think it's critically important that customers have the freedom to choose between multiple assistants, and select their preferred assistant for any task. That's why Amazon founded the Voice Interoperability Initiative, a coalition of over 80 companies dedicated to the vision that customers should have access to multiple, simultaneous voice services on a single device, each with its own wake word, enabling customers to talk to the service of their choice simply by saying its name.

Amazon's willingness to take risk and invest in the development of Echo and Alexa has been good for consumers and good for competition. Throughout Amazon's history, we have focused on empowering third-parties to create and grow their own businesses. We took the same approach with Alexa. In contrast to the approach of the incumbent phone-based assistants at the time, we made our technology available to third-party developers and manufacturers, allowing them to bring the power of voice to their own products and services.

For instance, third-party music services like Spotify, Pandora, and Tunes are available through Alexa. Developers can create brand new services, like voice-based games or education skills. We also make Alexa's technology available to third-party device manufacturers without any exclusivity requirements or licensing fees. This has allowed dozens of companies to build voice functionality directly into their own devices, making those devices more appealing and valuable to customers. We were the first company to do this, and it has significantly expanded customer choice and how to access voice assistants.

Finally, through our Alexa Smart Home program, we enabled manufacturers of smart home devices, such as lights, plugs, locks, and ceiling fans, to allow customers to control those devices by voice, making those devices more useful and valuable.

In conclusion, we are still in the very early days of the development of voice assistants and smart home devices. It is an intensely competitive and innovative space made even more so by Amazon's efforts to empower developers, empower manufacturers, and provide customers' choice. We appreciate the important work the Committee is doing in this space. We believe our goals are fundamentally aligned with those of the Committee to foster innovation, ensure competition, and create a digital future that works for all consumers.

Thank you for this opportunity to share our vision. I look forward to your questions.

[The prepared statement of Mr. McCrate appears as a submission for the record.]

Chair KLOBUCHAR. Thank you very much. Thank you for your testimony. Next up, Mr. Lazarus.

**STATEMENT OF EDDIE LAZARUS, CHIEF LEGAL
OFFICER, SONOS, SANTA BARBARA, CA**

Mr. LAZARUS. Thank you, Chair Klobuchar, Ranking Member Lee, and distinguished Members of the Subcommittee for the opportunity to appear before you. It is an honor to testify as the chief legal officer of Sonos, a hugely innovative company whose history from small startup to global enterprise embodies American tech innovation at its best.

Sonos was founded in 2002 by a handful of entrepreneurs who set out to reinvent home audio for the digital age. What Sonos' founders imagined was a world where the old home audio systems featuring passive speakers connected by wires to a centralized receiver would be replaced by a seamless experience where users could play music on wireless speakers that communicate with each other to produce what is known today as multi-room home audio.

Fast forward. Sonos employs roughly 1,500 people, and our products have been welcomed into more than 11 million homes. Our success is based in significant part on elevating the idea of consumer choice rather than a walled garden experience, including a choice among more than 100 music streaming services as well as between the two dominant voice assistants, Alexa and Google Assistant.

From our perspective, we see two possible futures in the smart home: In the first scenario, resulting from the current trajectory

we're on, every smart home will be controlled by one of a few dominate companies. These behemoths will exert overwhelming control over the direction of innovation and what new ideas make it market. In an alternative scenario, revamped antitrust law and enforcement will level and broaden the playing field. The second future is one in which companies like Sonos and countless others bring novel experiences to customers with the best ideas rising to the top. Consumers will enjoy greater choice, not merely to choose alternatives to the systems by the dominant companies, but also to mix and match easily among theirs and other offerings.

For Google and Amazon specifically, the smart home, this new and growing interface between their online enterprises and consumers presents both a threat and an opportunity. The threat is that if other companies were to be successful in the smart home space, they might stand between the dominant companies and customers. Meanwhile, the opportunity for Google and Amazon is to dominate yet another important consumer market, and even more critically, to use their smart home systems to collect vast amounts of consumer data which can be monetized on their already dominate and enormously profitable platforms.

In suppressing competition, a common strategy of Google and Amazon is to take on a competitor by flooding the market with similar products sold at highly subsidized prices, or even given away. Amazon and Google can afford to lose money on the speaker products because they aren't counting on profits from the product sales themselves. Instead, they make their money from the rich trove of personal data that these microphone-enabled products vacuum up from consumers.

The problem of cross-subsidization is compounded by restrictions on interoperability. The strategy of each of the dominate players is the aggregate demand on its own individual platform. They lure you into the walled garden with subsidized prices, and then they want to lock you in. Sonos and other innovators want to offer a different model, one that interoperates with each of the dominate players, but also unlocks consumers by enabling them to discover and choose from various other products and innovations. The dominate players often make that difficult, if not impossible either by prohibiting the implementation of new ideas or conditioning access to their platforms with anti-competitive demands.

Google and Amazon run sprawling, irreplaceable empires. One has to do business with them; and in many respects, those partnerships are mutually beneficial. There's a downside too. To gain access to their platforms and integrate with their services, these companies issue various take it or leave it demands, including early access to proprietary business information. This undercuts competition, especially when these companies then decide to use what they've learned about your business to produce and sell remarkably similar products.

We've been heartened as State and Federal antitrust agencies have begun to investigate, and in some cases, bring enforcement actions about the more egregious anti-competitive practices. These limited actions are not enough to protect consumers and promote the competitive process.

For that reason, we very much appreciate that Senator Klobuchar has introduced legislation to bolster antitrust enforcement. We know that Ranking Member Lee has now dropped his own bill that we will be studying closely. It's vitally important to recognize that a significant range of conduct that encompasses—that suppresses competition in the smart home falls outside existing law. An antitrust regime for the digital age must promote non-discrimination by addressing restrictions on interoperability, predatory pricing and cross subsidization, and misuse of data.

We urge Congress to act soon. Due to strong network effects, markets in the tech world can tip quickly, and it would be a shame to look back at the smart home space and wonder what might have been, if only.

Thank you for your consideration.

[The prepared statement of Mr. Lazarus appears as a submission for the record.]

Chair KLOBUCHAR. Thank you very much. Thanks for your testimony. Next up, Mr. Crawford.

**STATEMENT OF MATTHEW CRAWFORD,
RESEARCH FELLOW AT THE INSTITUTE FOR
ADVANCED STUDIES IN CULTURE, UNIVERSITY
OF VIRGINIA, SAN JOSE, CA**

Mr. CRAWFORD. Chair Klobuchar, Ranking Member Lee, and distinguished Members of the Committee, thank you for the opportunity to address you today.

I have no expertise in antitrust. I come to you as a student of history political thought. The convenience of a smart home may be worth the price. That's for each of us to decide. To do so with open eyes, one has to understand what the price is. After all, you don't pay a monthly fee for Alexa or Google Assistant.

The Sleep Number bed is typical of smart home devices. It comes with an app, of course, which you'll need to install to get the full benefits. Benefits for whom? To know that, you'd have to spend some time with the 12-page privacy policy that comes with the bed. There, you'll read about third-party sharing, Google analytics, targeted advertising, and much else. The contract specifies that the company can use your personal information, even after you cancel your Sleep Number account, and that the firm does not honor "Do not Track" notifications. By the way, the bed also transmits the audio signals in your bedroom, and I'm not making this up.

Whatever its appeal to the consumer, the business rationale for the smart home is to bring the intimate patterns of life into the fold of the surveillance economy, which has a one-way mirror quality. Increasingly, every aspect of our lives, our voices, our facial expressions, our political affiliations, and intellectual habits are laid bare as data to be collected by companies who, for their own part, guard with military grade secrecy the algorithms by which they use this information to determine the world that is presented to us. For example, when we enter a search term, or in our news feeds. They are also in a position to determine our standing in the reputational economy. The credit-rating agencies and insurance companies would like to know us more intimately. I suppose Alexa can help with that.

Allow me to offer a point of reference that comes from outside the tech debates entirely, but can be brought to bear on them. Conservative legal scholars have criticized a shift of power from Congress to the administrative state which seeks to bypass legislation and rule by executive fiat through administrative rulings. The appeal of this move, of course, is that it saves one the effort of persuading others; that is the inconvenience of democratic politics. I'd like to suggest that all the arguments that conservatives make about the administrative state can be applied as well to this new thing. I'll call it algorithmic governance that operates through artificial intelligence developed in the private sector. It too is a form of power that is not required to give an account of itself, and is therefore insulated from democratic pressures.

For reasons intrinsic to machine learning, the logic by which an AI reaches its conclusions is impossible to reconstruct, even for those who built the underlying algorithms, due to the complexity of how they interact a massive-iterated layers of inference. We need to consider the significance of this opacity in the light of our political traditions.

When a court issues a decision, the judge writes an opinion in which he explains his reasoning. He grounds the decision in law, precedent, common sense, and principles that he feels obliged to articulate and defend. This is what transforms the decision from mere fiat into something that is politically legitimate, capable of securing the ascent of a free people.

One distinguishing feature of a modern liberal society is that authority is supposed to be grounded in this way in our shared rationality rather than appealing to, say, a special talent for priestly divination. This is our enlightenment inheritance. It appears to be in a fragile state. With the inscrutable arcana of data science, a new priesthood peers into a hidden layer of reality that is revealed only by a self-taught AI program, the logic of which is beyond human knowing.

The feeling that one is ruled by a class of experts who cannot be addressed, who cannot be held to account, has surely contributed to populist anger. From the perspective ordinary citizens, the usual distinction between government and the private sector starts to sound like a joke, given how concentrations of economic power order our lives in far-reaching ways.

Google, Facebook, Twitter, and Amazon have established portals that people feel they have to pass through to conduct the business of life and to participate in the common life of the Nation. Such bottlenecks are a natural consequence of the network effect. It was early innovations that allowed these firms to take up their positions. It is not innovation, it is these established positions and the ongoing control of the data it allows them to gather that accounts for the unprecedented rents they're able to collect, as in a classic infrastructure monopoly. If those profits measure anything at all, it is the reach of a grid of surveillance that continues to spread and deepen. It is this grid's basic lack of intelligibility that renders it politically unaccountable, yet accountability is the very essence of representative government.

Mr. Zuckerberg has said frankly that, "In a lot of ways, Facebook is more like a government than a traditional company." If we take

the man at his word, it would seem to raise the question: Can the U.S. Government tolerate the existence of a rival government within its territory?

In 1776, we answered that question with a resounding no, and then fought a Revolutionary War to make it so. The slogan of that war was, “Don’t Tread on Me.” This spirited insistence on self-rule expresses the emotional core of republicanism. As Senator Klobuchar points out in her book, “Antitrust,” the slogan was directed, in particular, at the British Crown’s grant of monopoly charters to corporations that controlled trade with the Colonies.

Today, the platform firms appear to many as a foreign imperial power. The fundamental question, who rules, is pressed upon this body once again.

Thank you.

[The prepared statement of Mr. Crawford appears as a submission for the record.]

Chair KLOBUCHAR. Thank you very much. Mr. Zittrain.

**STATEMENT OF JONATHAN ZITTRAIN, PROFESSOR OF
LAW AND PROFESSOR OF COMPUTER SCIENCE,
HARVARD UNIVERSITY, CAMBRIDGE, MA**

Professor ZITTRAIN. Thanks very much. The Internet of Things might join artificial intelligence as being a little like asbestos. It’s very useful. It can accumulate in your house without you really thinking about it. It may cause unforeseen problems that make you wish it were gone, at which point, it’s hard to get a do-over.

It’s easy to look back at the way the internet developed, and feel like it was all inevitable. It was not. A few decades ago, we were on a course toward a very different future. I know, because I was there, and I was very excited about it. In the late 1980s, I was a teenage administrator on what I thought was the future of networking, CompuServe. That’s right. I was the coolest kid on my street.

CompuServe and its many proprietary competitors were walled gardens. If you were on CompuServe, you could email only other CompuServe users, and you could only visit pages and services that CompuServe set up. That tended to lock you in after you joined. CompuServe failed, along with all its many competitors, because a small group of engineers, standards committees, and National Science Foundation-funded researchers came up with a different idea: an open standard for letting computers connect to each other.

That idea spawned a new generative network that rendered my beloved CompuServe obsolete because it was better. Both people and companies wanted to join it. Why would they lock themselves into a CompuServe when they could connect to the internet? That outcome wasn’t inevitable, and individual companies like CompuServe had no incentive to create it. It came about because of what seems, in retrospect, like happenstance. A well-timed alchemy of some Federal funding, some creative open standards, and a relatively small handful of people with an idea who happened to have no desire to monopolize it.

Today, when you pick a brand of phone or a smart home control system, you can lock yourself into that platform. If you have an iPhone, but decide that Alexa or Google’s voice assistant has some

feature you like, such as controlling a new thermostat, what do you do? You can't easily set up an iPhone to use Google Assistant; or an Android phone to use Siri, and that's not because of technical hurdles. It's because of natural plays for advantage by vendors bundling their own phones with their own assistants. Your not-so-practical option is to buy a new phone, which might orphan some of the other devices in your house. Apologies of my use of the digital assistants' names woke up the devices of anyone watching this hearing.

Stepping back, it seems absurd that buying a new telephone could affect your air conditioner, but that's not an unusual situation right now, and it has a lot of momentum. At its peak, CompuServe had about two million users. Today there are over 1 billion Apple iPhones in use, and 2 billion users of Google's Chrome. There are 100 million Alexa devices out there. That's the upstart.

My written testimony has more on my suggestions, but here are a few ideas for actions Congress could take toward a better future that might not happen on its own. First, reform antitrust law to foreclose some of the vertical integration and lock-in strategies that would tempt major vendors. The law should contemplate breaking the artificial connection between which phone we purchase and which assistant we are to use, between which assistant we use and which devices it can instruct, and for the devices themselves between what hardware we purchase and who can write the software that runs upon it.

To deter lock-in, devices that lose their internet connection should keep working at least as well as their non-smart counterparts. No one who buys a coffee maker expects it to stop working one morning because the company who made it decided to charge a subscription fee or pivot to mouse traps.

Second, Congress should subsidize people and organizations developing freely licensed standards and software for smart devices, and protect those who want to tinker with those devices and test them for security and privacy. Basic support for internet protocol development was perhaps some of the best bang for the buck that the American taxpayer has ever seen in the history of this country. Those investments pay off, and we should make more of them.

Third, law makers must set new rules around privacy for the always-on passive devices all over our homes that can be used or conscripted to glean constant telemetry, including audio and video. For many of them, there's simply no way to discover what they're recording and where they're sending it, whether for their own purposes or under legal process. We need consistent, transparent, and appropriately restrictive rules of the road now before habits of surveillance for home technologies are established and then deemed indispensable.

At least as important, security won't provide for itself. We need to cultivate a new generation of well-governed App Store-style marketplaces that can vet applications for safety without becoming anti-competitive tools. Technology regulators so often have to take a deep breath and throw a dart somewhere between too early to tell and too late to do anything about it. Now is the time to arrive at a vision for what the public interest demands of this new, prom-

ising, and perhaps enduring set of technologies, and to set clear boundaries for market players to appreciate and respect. That can help prevent the problems that will be much harder to patch later.

Thank you very much.

[The prepared statement of Professor Zittrain appears as a submission for the record.]

Chair KLOBUCHAR. Very good. Thank you to all of our witnesses. I'll get started, and then I'll turn it over to Senator Lee. I know Senator Blumenthal is going to be joining us very soon.

We have heard concerns. I guess I give this to Mr. McCrate and Mr. White. We've heard concerns that the prominent role that Amazon and Google play in connected home technologies could allow your companies to limit or degrade the ability of smart devices so their companies to operate seamlessly in the connected home. In theory, you could do this by excluding or limiting the functionality of competing devices. For now, your companies do talk about promoting interoperability, but as your companies expand their connected home device offerings and it becomes a bigger and bigger market, much bigger than where it is now, I have concerns about your incentives to preference your own connected devices over competing products.

Given some of the other self-preferencing we've seen in other aspects of the tech business, why shouldn't we be concerned? Even if you're promoting interoperability now, when these markets are developing, what is to stop you from changing your policies once you have an even more entrenched market position? What commitments will you make here today, under oath, about specifically how you will support interoperability for how long, and who will oversee these commitments to ensure compliance for connected home devices?

Those were a lot of questions, so Mr. McCrate, I'll just sum it up in even if you're promoting interoperability now, what's to stop you from changing your policies? That's first. Number two, what commitments you'll make here today about how you will support interoperability? For how long? Who will oversee those commitments? Mr. McCrate, do you want to get started?

We could go to—

Mr. McCrate. Particularly—

Chair KLOBUCHAR. We could go to—again, we could go to Mr. White first if we want.

Mr. WHITE. Thank you for the question, Senator Klobuchar. As we've, and several of the other panelists here have said, this is a new and evolving space. It's very dynamic. I can't predict what the future of this space will look like, but early signs are promising, and I think you are grappling with the right questions of how do we ensure we maximize the benefits of where this space is heading, and mitigating against some of the potential issues.

One of the areas that we've identified as an industry is this area of interoperability, and there is a robust conversation happening across the industry to try to address some of these issues. As I mentioned in my testimony, we joined with almost 200 other companies to work on this secure connectivity standard; an open protocol so that these various smart home devices and smart home ecosystems can interact with each other. That's a promising con-

versation. The industry is engaged in that. We are contributing to that.

I think one of the mitigators to the risk that you're identifying is the fact that it's not just the big companies that are a part of this working group. It's companies big and small, and we're hoping that more companies get involved in this working group so that it really is sustaining this—the evolution of this technology well into the future.

Chair KLOBUCHAR. Okay. Other than the working group, which I appreciate, can you specifically say that you will support interoperability and answer who's going to oversee those commitments?

Mr. WHITE. Yes, Senator. Generally speaking, on interoperability, we support, and we will support. It's kind of our corporate ethos to support openness.

There's some technical specifics on specific implementations. Like, this is an evolving space where you have a very diverse set of devices form factors. It's not clear yet, today, that each of those various form factors will have the same evolutionary path. I think we need to continue to follow that and continue to invest and innovate in this space with the North Star toward interoperability. At a general level, I can say that.

Then, who oversees this. I think, right now, the industry is doing a good job of tackling some of these questions. I think our position would be let's see where the industry—where the industry can get. And if there are areas where we need additional help or oversight, I think that's a great area for this group, across policymakers, academia, civil society—

Chair KLOBUCHAR. Okay.

Mr. WHITE [continuing]. And the private sector to work on it.

Chair KLOBUCHAR. All right. Thanks. Mr. McCrate, do you want to answer?

Mr. McCrate. Thank you.

Chair KLOBUCHAR. Okay. I think we hear you there.

Mr. McCrate. I apologize for the challenges here.

Chair KLOBUCHAR. Don't worry about this. It's fine. Go ahead.

Mr. McCrate. Sure. Thank you for the question. It's a super important topic. Amazon strives to be Earth's most customer-centric company, so we make all of our product decisions, working backward from what we think is in the best interest of the customer. That's true today and it will be true in the future.

We think having—giving customers the option to use multiple different assistants from a single device is important. We think interoperability is important. We want customers to have a simple smart home experience where they can buy a device in a store without a lot of thought of whether it's going to work with their assistant at home, and things just seamlessly work.

We are continuing to be focused on making that device simpler for customers and making sure Alexa works with devices from all manufacturers.

Chair KLOBUCHAR. Okay. Are you going to ensure us that you will always support interoperability and who's going to oversee that?

Mr. McCrate. Senator, I can assure you that we will always work backward, in the motion of the best interest of our customers. We think that includes interoperability.

Chair KLOBUCHAR. Thank you. Mr. Lazarus, as a seller of connected devices at Sonos, that interoperate with Amazon and Google, does the testimony that you just heard, does that give you any comfort?

Mr. LAZARUS. Not a lot of comfort, Senator.

Chair KLOBUCHAR. Okay. Could you explain why?

Mr. LAZARUS. That just give an example on the voice interoperability. I was interested to hear the emphasis that the representative from Amazon put on the voice interoperability initiative—

Chair KLOBUCHAR. Is your microphone on there?

Mr. LAZARUS. I apologize.

Chair KLOBUCHAR. That's okay.

Mr. LAZARUS. I was very—

Chair KLOBUCHAR. We're having a lot of interesting, connected speaker issues. No. Okay. Continue on, Mr. Lazarus.

Mr. LAZARUS. Could you hear the beginning of what I said?

Chair KLOBUCHAR. You can start over. It's fine.

Mr. LAZARUS. I said it didn't give a lot of comfort, Senator. I wanted to give an example. I was interested to hear the emphasis that the representative from Amazon put on the Voice Interoperability Initiative, which is actually an idea that Sonos promoted to Amazon. The reason I'm interested in this is the interplay between Amazon and Google here is that it catches us in the middle.

We actually invented a technology called Concurrency, which allows you to just look at your speaker and channel into a variety of voice assistants just using wake words. If you look at the speaker and say, "Hey, Alexa," it will go into Amazon. If you say, "Hey, Google," it will go into the Google Assistant. Or another assistant if there were one.

Google contractually prohibits us from using that technology, and the Voice Interoperability Initiative, which is an excellent idea, and we appreciate that Amazon is partnering with companies, it's just an on-ramp into the Amazon ecosystem now because you can't mix and match between the big companies.

That's, as Professor Zittrain mentioned, that mixing and matching ability is crucial when you talk about interoperability. We would hope that this Committee would look very carefully as the House Subcommittee did at requiring that ability to go between the ecosystems seamlessly, and not just enter one ecosystem with your device.

Chair KLOBUCHAR. Okay. Thank you. Professor Zittrain, in the European Commissions Preliminary Report about connected home devices, many connected device manufacturers cited interoperability as a significant barrier to market entry or expansion. Are company-lead interoperability efforts the best way to have a competitive and interoperable home tech ecosystem? What do you think would work better?

Professor ZITTRAIN. Thanks very much for your question. I think the answer to that lies a little bit in the previous exchange. It's totally understandable that our industry colleagues would say, "Yes. We like competition. We're here to promote it. We'll let you know

if we need help.” It’s the kind of thing that may be better as setting certain ground rules for competition than simply waiting to see if any of them has a motive to sort of dash if they find themselves in the lead.

I think, for example, Mr. McCrate’s discussion of the current positioning of Alexa and its commitment to interoperability rings true as pretty accurate to me. Of course, I might ask him, “Well, is it possible for somebody to sell books on a Kindle that they’re not going to run through Amazon?” That might be a little trickier because that’s a different market in which Amazon has a different configuration.

That gets back to your question about industry initiatives. They can be very well organized if you bring the right— “right players” to the table. They can come to an accord, and then very quickly, if they are serious about it, implement it through their respective ecosystems.

The drawbacks are also significant because it may turn out that they come to an agreement that in turn, to use antitrust lingo, restrains trade that works for them but not for everybody else. Figuring out how to have industry associations and standard-setting processes that might be in a more open, multi-stakeholder as they call it, realm. In my own testimony, I liken it to that of the Internet Engineering Task Force, which has corporate participation, but not corporate governance. It’s those processes that you can’t copy and paste them over, but might be worth exploring to see how best to represent all of the many spinning gears of this ecosystem.

Chair KLOBUCHAR. Okay. Very good. I’m just going to ask just one really fast question because we have three Senators here.

Mr. White and Mr. McCrate, just one-sentence, two-sentence answers. You store your connected speakers—you store what your connected speakers hear from consumers in their homes when they ask something like, “Play Lizzo, or Prince, or Bob Dylan,” not to mention only Minnesota artists.

How do you monetize the data you collect from your digital voice assistants? How much revenue did that generate for each of your companies last year? Do you monetize that? Mr. White, you can go first again, if you’d like. Or Mr. McCrate.

Mr. WHITE. I’m happy to go first, Senator. On the financial side of things, I don’t think we break down our profitability by product area that way. The numbers that I’m able to share are the numbers that are in our public SEC files on that particular part of your question.

In terms of how we monetize the data, when you are interacting with the Google Assistant, your voice recordings are not stored unless you decide to have those recordings stored. Then, we give users transparency and control over the data that’s actually being collected from the Google Assistant. They can go into their Google account, see what data is being collected. They can make decisions around how that data is used, whether they want to delete it. Recently, we actually changed our data retention policy so that for new users, data is on an auto-delete schedule.

Chair KLOBUCHAR. Okay. Mr. McCrate, do you want to add anything?

Mr. McCrate. Senator, privacy is the foundation of how we approach Alexa and our Echo devices. We do not sell customers' data. We do not sell customers' voice recordings. We make money through Alexa when customers use paid Amazon services, like our Amazon Music subscription.

Chair KLOBUCHAR. Okay. All right. I'm going to turn it over to Senator Lee. Then following that will be Senator Blumenthal, then Senator Hawley.

Senator LEE. Thank you. Mr. McCrate, I'd like to start with you. Before we get into smart home devices, I want to follow-up with you regarding a response that I received from a person named Shannon Kellog at Amazon. Representative Ken Buck and I received a letter—we sent a letter to Jeff Bezos with some fact-finding questions related to some very serious concerns about Amazon's involvement in the Jedi procurement process at the U.S. Department of Defense. Instead of a helpful reply, or any kind of a meaningful engagement from Mr. Bezos or anyone else at Amazon, we instead received a form letter from Mr. Kellog, rather cavalierly dismissing our concerns entirely and refusing to answer our questions.

First, I hope your level of engagement with us today will rise above that abysmally disappointing level. More importantly, will you promise to raise this issue with Mr. Bezos, to ensure that we get some actual answers to our questions? To be honest, Amazon's initial refusal to answer our questions only makes it look like there's something to hide. Is there?

Mr. McCrate. Senator, no. I don't believe so. That's not an area that I'm familiar with, but I will certainly raise it with my colleagues, and we can follow-up with your office with more details.

Senator LEE. Okay. Thank you. This is deeply concerning to me, and as I'm sure you can appreciate, I expect that when I raise a very serious question that it will be met with a serious answer. We did not receive that, not in the slightest, from Mr. Kellog.

Dr. Crawford, for years I've been concerned about the Federal Government violating the civil liberties of the American people, and you raised, in your opening testimony, some very valid points about how any American concerned about how civil liberties might be eroded by Government should likewise be concerned about how that might happen with Big Business and Big Tech in particular.

We're all voluntarily installing internet-connected microphones in our kitchens, our living rooms, and even as you point out, in our bedroom. Do you see a risk that Big Tech and Big Government might actually work together in the future to the detriment of the people? In particular, work together in a way that they could find a way to circumvent some of the protections that lie against Government simply by virtue of the fact that they're going through a third-party intermediary who's been invited into the home?

Mr. CRAWFORD. Thank you for that question. I think it gets at something very important. One point of historical comparison, so the progressives of a century ago, Teddy Roosevelt's time, took on the monopolies not out of class warfare, but because they understood that once it progresses beyond a certain point, the concentration of economic power becomes incompatible with representative government.

What are the prospects for that kind of corrective action today? Many of today's progressives appear to be preoccupied with cultural issues rather than securing the conditions for a widely-shared prosperity. This gets to your question. Will the tech firms enjoy a light regulatory touch in exchange for becoming enforcers of a top-down social transformation? This—the work of censorship would be outsourced to private corporations not subject to the First Amendment. A creeping substitution of constitutional government with the kind of governance we associate with HR departments.

I think any dissident-minded person today fears that kind of consolidation of power along an axis that runs from DC to Palo Alto. I think these two polls need to remain separate and opposed if self-governance is to remain viable.

Senator LEE. Would you agree with me if I added to that statement, which was very well expressed, that it wouldn't necessarily even need to be contingent upon a quid pro quo arrangement for light regulatory touch in exchange for participation in assorting, sort of brooding omnipresent police state? This could happen much more subtly, just simply by virtue of the fact that the First Amendment itself applies to governments and not corporations. Once a corporation has been invited into someone's kitchen, living room, or bedroom, they're collecting business information. That business can then choose to sell that information to others, including a government.

Mr. CRAWFORD. I think that's right that quite apart from any—you know, actually a sort of collusive arrangement, the issue is cultural. It often appears, you know, from a fly over country or just a lot of places, that there is a kind of clearancy that shares a lot of presuppositions about the need to transform society, and that there's a like-mindedness there. It doesn't require coordination. It's this—I'm just trying to give voice to this feeling that we kind of entered a more oligarchic phase of American history and the power operating in sort of obscure ways that hard to put your finger on. Certainly, the mentality that prevails, you know, in Big Tech is very much aligned with the most progressive elements of the Democratic Party.

Senator LEE. I've got that—another question that I think relates to that in some ways. Many of us have heard about Amazon Sidewalk by now, a feature, if you call it that. Amazon Sidewalk, a feature of Amazon devices in the home that will share your internet connection with strangers to facilitate Amazon services like device location, et cetera. It will do that unless you affirmatively opt out. Is that something that you think people ought to be concerned about from a civil liberties standpoint?

Mr. CRAWFORD. We, I have no expert knowledge or any knowledge about that in particular. Just speaking as a citizen, I certainly wouldn't want the comings and goings of, my friends known in that way. Because we don't know what use that information has.

There is something called pattern of life analysis. It was developed for military intelligence purposes that has become, I think, a prominent part of the business platform. In other words, if you know peoples' comings and goings, and who they're meeting with, you can infer quite a bit about people. This has become one of the planks in the surveillance economy.

Senator LEE. Madam Chair, I see my time is expired. Can I ask one follow-up question—

Chair KLOBUCHAR. Of course.

Senator LEE. Mr. McCrate, tell me what you're doing. How are you protecting—how, if at all, are you protecting your customers' internet security and privacy using this Sidewalk feature?

Mr. McCrate. Yes, Senator. Protecting the privacy and security of our customers' data is foundational to everything that we do at Amazon. Both privacy and security were built into the Sidewalk Network from the ground up. We apply multiple layers of encryption to the traffic passed over Sidewalk to ensure that customers' data is safe and secure.

Senator LEE. All right. I'm going to want to follow-up more on that later. Thank you, Madam Chair.

Chair KLOBUCHAR. Excellent. Next up, Senator Blumenthal.

Senator BLUMENTHAL. Thank you, Senator Klobuchar, and thank you for pursuing these very, very enlightening and instructive hearings. Fortunately, we're not required to read the book—the book before the hearing, although I am already a major part through it—

Chair KLOBUCHAR. Very good.

Senator BLUMENTHAL [continuing]. And much better equipped because of it.

Chair KLOBUCHAR. Okay. I noted the pages you were mentioned on, Senator Blumenthal.

Senator LEE. I've also translated into Swahili.

[Laughter.]

Chair KLOBUCHAR. Okay. Please continue, Senator Blumenthal.

Senator BLUMENTHAL. Thank you, Madam Chair. In April—well first, let me say I know earlier in the hearing, I heard Senator Klobuchar welcome Lina Cohn—

Chair KLOBUCHAR. No. That's not—I don't think it's officially announced yet.

Senator BLUMENTHAL. I want to welcome her to the FTC, and I think it will begin a new chapter in the FTC's work, and I look forward to working with her and the entire FTC, as does Senator Klobuchar in this vital area of enforcing antitrust.

In April, this Subcommittee held a really compelling hearing on competition in the app store marketplace, familiar to all of you. We heard really stunning reports about how Google and Apple use their control over the app stores and mobile operating systems to extract rents, really exorbitant rents, and exclude rival products.

One of the witnesses was Tile, an Internet of Things, a product designed to help consumers find their lost items, as if to illustrate the point right before our app store hearing, Apple launched AirTags, which appears to be a carbon copy of Tiles products. At the hearing, Tile shared its concerns that Apple was using its control over iPhones and Apple's operating systems to unfairly limit competition and benefit AirTags over Tile products. Though the app store Apple had access to Tile's sensitive business information with no guarantees Apple would not repurpose that data to advantage its own products. Tile has also claimed that Apple has blocked or limited its access to new iPhone features.

The app store and mobile market have almost taken over the digital economy. As all of us here know, more and more consumers are using mobile phones as opposed to laptops or desktop computers. I believe this area is one where it is really appropriate for Congress to set some clear, bright lines about what these gatekeepers can or cannot do.

Let me first turn to Mr. White. As you recall, at the app store hearing, you testified that it was your “understanding” that Google has “data access controls in place that govern how data from our third-party services are used.”

I really want to set the record straight. Google performs platforms for businesses to distribute apps through the Google Play store and its Internet of Things Echo System. Does Google have a firewall? Does it have a firewall between these platforms and its product development teams? In other words, does Google ensure that the data it collects from third-party software developers, often sensitive business information, is not used to compete with those developers?

Mr. WHITE. Thank you for the question, Senator, and good to see you again in this forum. As I said in the previous app store hearing, we do have data accessing controls in place. We also have internal policies in place that govern how we use data that we get from our partners for competitive purposes.

Senator BLUMENTHAL. You’re saying there’s an impenetrable firewall that prevents any exchange of information?

Mr. WHITE. Senator, I can’t say that. The term “firewall” may have technical understanding of that, and I can’t say that—

Senator BLUMENTHAL. That’s why I asked the question with that word.

Mr. WHITE. Yes. I can’t say that, as I sit here today. I’m happy to have our team follow-up with you to get more specifics on that. I do know that we have data access controls in place and internal policies that govern how we use data from our valued partners.

Senator BLUMENTHAL. From what I take in my understanding of your response, there is no firewall. There are policies. There are controls, but no firewall. I’d be happy for your team to provide more detail. My understanding there is no firewall.

Let me ask Mr. McCrate the same question. You provide one of the largest marketplaces for electronics, and you provide the Alexa Voice Assistant to third parties. You collect a lot, and I mean tons, of confidential business information about your competitors. Does Amazon have firewalls, I use that word “firewalls,” to ensure that it does not use competitors’ data against them or rig the system for Amazon’s own product?

Mr. MCCrate. Senator, preserving the trust of our third-party partners is critical to the success of Alexa. We know that we have to use the data that we receive appropriately in order for third parties to continue to work with us and make their services available.

We focus on using the information we receive through customers’ use of Alexa to improve Alexa overall, including for our third-party partners.

Senator BLUMENTHAL. I’m going to take this as a no, you do not have firewalls. My time is limited, so I’m happy to have you respond further in writing. You have no firewalls.

Professor Zittrain, as gatekeepers, Google, Amazon, and Apple have access to troves of sensitive business information, as we all know, about their competitors. Don't we need firewalls between app stores, Internet of Things, platforms, and other product development teams to restore competition to marketplaces?

Professor ZITTRAIN. Yes. I'd be supportive of that. I think that it's understandable that companies, as creative and big, and with as much spare cash as some of the ones you've mentioned, they're going to want to get into all sorts of different businesses. There may be, in that classic word "synergies" among them; and that's how you can be both the platform offering something and then one of the vendors on your own platform. It's the way Google might offer ads on its own service for its own stuff. There are sensitivities around when that form of involvement in so many different aspects of what otherwise is a marketplace with different players amounts to an unfair thumb on the scale where instead of the most innovative, or the cheapest, or the best product winning, you end up with the one that is sort of on the home team. The sorts of prophylactic measures you're talking about would be a way of being able to say, "Look, if you want to play in multiple spheres here in their interlinked ones," you know, "we understand that might be worthwhile." There needs to be ways to ensure that you don't end up in a winner-take-all environment because of your doing that.

Senator BLUMENTHAL. Thank you. You know, I'll just say in conclusion, and I apologize I'm a little bit over my time. In the days of the progressive, mentioned by Mr. Crawford, the power was in railroad tracks and in oil wells. What we have here is power in data. Control over data, whether it's the privacy of individual consumers, data which should belong to her, or the data that is collected by these behemoths, Amazon and Google, where they can use it in effect against their so-called customers and compete against them unfairly, and deprive consumers of innovation and competition.

That's the reason that we're here today, because the Internet of Things threatens to become a vehicle for anti-competitive steps when these behemoths weaponize it. I think we need to take bold action, like lines of business restrictions and data firewalls to prevent Big Tech from weaponizing those troves of sensitive data to further their own business interests and squash competition. Again, I think we have here conflicts of interest where gatekeepers and operators of online platforms and marketers of their own products have dual and conflicting roles, and it's an environment, as a result of that conflict, that is rife with exploitation and appropriation every bit as serious as in the days of the oil well titans or the railroad behemoths, even though it's a lot less visible.

Thank you, Madam Chair.

Chair KLOBUCHAR. Thank you very much, Senator Blumenthal. Next up, Senator Hawley. Thank you.

Senator HAWLEY. Thank you very much, Madam Chair. Thanks to you and the Ranking Member for organizing these hearings. I just want to say, in response to some of the last comments from the last witness, that I personally don't think—I always put my cards on the table. I don't think there's any reason that one company ought to be able to be simultaneously—let's take Amazon for

example, a book retailer, a movie studio, a grocery store, a delivery network, a clothing business, a smart home business, a TV network, a web technology hosting company, an e-reading manufacturer, a digital music vendor, a game studio, a publishing house, and I could go on. Those lines of businesses aren't related. What we see here, there's a pattern.

You know, these hearings that the Chairwoman has organized against different industries, there is a distinct pattern here. We always have the same two or three people are here every single time: Amazon, and Google, and Apple are here at almost every hearing. Why? Because they have—they're dominate market players that are leveraging their dominance in core markets, and using it to capture dominance in other markets.

It's always the same story, no matter the industry. It's these two or three behemoths, and then it's some competitor who they're trying to edge out, and they're trying to box out by using their market power. We see it over and over, and we see the same tactics over and over. We see predatory pricing. We see self-preferencing. We see exclusionary conduct, and we're seeing it here, in the market that we're talking about today.

I mean, here we've got these companies using their power in voice assistant services and smart home technology to fortify their existing search, and shopping, and other lines of businesses. Again, they do it by cross subsidizing it—cross subsidizing. They do it by using third-party data that they have access to. They use it by—they do it by insulating their own offerings to squeeze out the competition, for instance by making their own services set as defaults, which is what Amazon has done with the Sidewalk device setup that Senator Lee was asking about.

All of that to say I think we're seeing a pretty consistent pattern here, and I think the time has come to say that we have got to prevent these massive dominate firms from buying up market share and using their own dominate positions in one market to leverage into a dominate position in another market. I propose legislation to do this. I know the Chairwoman has legislation of her own that would also update our antitrust laws. I hope that we can find some agreement here to go forward because I think it is becoming more and more apparent that we need big changes in order to confront the big problems that we have across these different markets.

Mr. McCrate, if I could just come back to you. I want to follow-up on Senator Lee's line of questioning when it comes to the Amazon Sidewalk device setup. Why did you decide to make Amazon Sidewalk opt-out only rather than opt-in? Why did you set the default that way?

Mr. McCrate. Senator, we make all of our product decisions at Amazon by working backward from the customer. We think the Sidewalk network has many benefits that will help customers better manage their devices, find lost items, and simplify their smart home setup.

We inform customers about Sidewalk. We make it easy for them to choose whether they want to participate.

Senator HAWLEY. Yes. You didn't really answer my question. I mean, are you worried that your customers would not want to opt-in? I mean, is that why you set the default the way you did? Why

did you make it difficult? I bet most of your customers don't even know about this. Why did you default it to opt it in, and then go figure out how to opt out of it? I mean, why was the default set where it was?

Mr. McCrate. Senator, we set the default the way that it was because we think that's the best experience for our customers. The Sidewalk network provides many benefits in helping customers keep their devices online and simplify setup. We did email all customers and notify them that Sidewalk was going to be available and make it easy for customers to configure that setting.

Senator HAWLEY. What's the—well, I'd be interested to see from a customer's perspective if they think it's easy. What steps have you taken to ensure that users who's been with get tapped under this program will not be held liable for any misuse of their internet connection, or for violations of Amazon's terms of service by devices from another household?

Mr. T4MCrate. Senator, the Sidewalk network uses only a very small amount of information. It's help—I think there's a lot of misperceptions in the press about what Sidewalk is or isn't. It's not about sharing your internet network to allow someone to stream a movie, or to check their email, or to browse websites. It's really focused on sending very small amounts of information over distances that can't be covered by WiFi.

Senator HAWLEY. The Kindle Fire tablets don't—

Mr. McCrate. I think I—

Senator HAWLEY [continuing]. Have access to the Sidewalk network?

Mr. McCrate. The tablets might use the Sidewalk network to help set up another device, but they don't access the internet or browse websites over the network. An example that might be helpful, just going back to Tile—talk. Sidewalk network, like many services at Amazon, was designed to help and enable third-party developers. Tile, which makes small devices you can attach to your keychain or put in your purse to help find lost items, is one of the partners we're working with on Sidewalk.

Today, if you lose a Tile device, you can find the Tile device if another customer with the Tile app on their phone happens to walk by that device. A small amount of information gets sent to the device to that customer's phone through the internet to the customer who lost the device. Sidewalk just enables an extension of that, so now you can find your device if it's within range of a Sidewalk-enabled Echo device.

Again, it's a very small amount of information. Here is the lost device. Here is the approximate location. The customer who lost it can help find it.

Senator HAWLEY. Let me ask you this, in your Sidewalk paper—the Amazon Sidewalk white paper, you say, “Amazon Sidewalk won't support third-party devices immediately at launch, but we will make careful choices about the information they receive from Sidewalk. We'll have more details in the future.” What third-party devices do you plan to give access to the Sidewalk network?

Mr. McCrate. Senator, I don't directly support the Sidewalk team, and I don't have all of those details, but I do know that Tile is one of the partners we're planning to launch with.

Senator HAWLEY. Can you give me an answer to that question in writing, then, what third-party devices you plan to give access to? Because it seems to me like you're in a bit of a bind here. On the one end, if you don't open this network up to third-party devices, then that looks like anti-competitive conduct. On the other hand, if you do open it up, you've created a situation in which Amazon device owners, by default because you've opted to set the default as opted in, not opted out, they might be inviting all kinds of potential security threats into their home because of the internet connection. It seems to me like a pretty relevant question. Can I get an answer from you in writing about what devices you plan to give access to?

Mr. McCrate. Certainly, Senator. I'd be happy to do that.

Senator HAWLEY. Let me, in my brief time remaining, let me, Mr. McCrate, just ask you about this. What's the cost to make and sell an Alexa unit approximately?

Mr. McCrate. Senator, I don't have that figure handy. There's a wide variety of devices in our lineup that come at different price points and with different costs.

Senator HAWLEY. Have these products—has the Alexa unit ever been sold to consumers below cost?

Mr. McCrate. Senator, I'm sure that it has. We focus on producing our devices as a low cost as possible so that we can provide competitive pricing to customers. We frequently have to price match or put our devices on promotion to compete with other devices. In those instances, I'm sure there's instances where it's sold below cost.

Senator HAWLEY. Yes. I'm sure there is too. I'm glad you admitted it, and I'm sure that Mr. Lazarus could probably speak to this as well. I mean, when you're facing somebody like Amazon that has the ability, this is classic cross subsidizing. They have the ability to sell their units at sometimes dramatically, probably, below cost for the idea of pricing out a competitor, it's kind of hard to compete with that. When you have somebody who is deliberating doing this as policy.

I know I'm over time, Madam Chair. I'll stop here, but maybe I'll get Mr. Lazarus if it's all right with you. It looks like it must be. Is that all right with you, Mr. Chairman?

Senator LEE [presiding]. Yes.

Senator HAWLEY. Good.

Mr. LAZARUS. I can be very brief, Senator.

Senator HAWLEY. Go ahead.

Mr. LAZARUS. Amen. It does happen. The devices are even given away, and it makes it very difficult for companies that have to make money on the devices as opposed to making money on the data.

Senator LEE. Okay. Senator Ossoff.

Senator OSSOFF. Thank you, Mr. Chairman. Thank you to our panel. I'd like to begin with you, Mr. McCrate. Regarding Amazon products that function with connections to WiFi networks, what data regarding other devices on those same networks produced by other manufacturers might Amazon devices collect, particularly Amazon devices that act as a hub or a bridge between various networked devices?

Mr. McCrate. Senator, I believe you may be referring to smart home devices that would operate on the same network as, for instance, an Echo device. Some of our Echo devices include hub technology, ZigBee in particular, to allow customers to add smart lights, smart door locks, other things like that through an Echo device to the internet. In that case, we do receive information about the status of those devices so that we can control them on customers' behalf through Alexa.

Senator OSSOFF. You'd be collecting information, for example, in that case about when, where, and in what rooms customers may be turning on or off the lights; when and where within their homes they might be using connected cleaning devices. What other kinds of information might you collect from third-party devices on the same network as yours? What is the utility of that data to you from a marketing and commercial standpoint, please?

Mr. McCrate. Certainly, Senator. Again, in instances in which customers have connected a smart home device to Alexa, they want to be able to use Alexa to control that device. Knowing whether, for instance, a smart light is on or off makes it easier for us to actuate a route a customer's request if they say, "Alexa, turn off the light." We would need to know which lights are on and which lights are off in order to know which light to direct that to.

We also have a feature where we can proactively notify customers if something seems off in their house. If they have left the basement light on late at night, Alexa can notify them that their light is on and ask them if they would like us to turn them off for them.

Senator OSSOFF. Does that kind of data allow you to generate market insights, pattern of life information, that makes you better able to market products to those customers? Secondarily, do you ever sell any of that data to third parties?

Mr. McCrate. Senator, no. We do not sell customer data at Amazon. We're focusing on using the data we receive through customers' use of our services to provide and improve the services on behalf of customers. We also put customers in control of that data. For smart home data in particular, customers are able to delete that data on demand, or configure Alexa to automatically delete that data after certain time periods.

Senator OSSOFF. Just returning to the first half of my question. This allows you to build, particularly as more and more such devices are implemented in a customer's home, a pretty comprehensive picture of their pattern of life. When and where they are moving within their home. When and where they're activating devices, turning lights off and on, perhaps using devices related to sleep or childcare. Is that data useful to Amazon from a marketing and customer profiling, customer insights standpoint?

Mr. McCrate. Senator, we use that data to provide and improve the service that we make available to customers. In particular—

Senator OSSOFF. It gets—

Mr. McCrate [continuing]. I can't find—

Senator OSSOFF. Then forgive me, Mr. McCrate, but my time is limited. You've made that statement. My question is whether or not you are able to glean market insights or information that im-

proves your marketing capabilities by developing pattern of life information about users of your devices?

Mr. McCrate. Senator, I'm not sure I'm totally following the question of what you're asking. We do not use that information that we receive from customers' smart home devices to serve advertisements to those customers. I could find—

Senator OSSOFF. That wasn't my precise question, but I think we'll be able to drill down a little bit more on some specific hypotheticals for the record, Mr. McCrate, just to get more insight as the utility of all this data that Amazon is gathering from devices connected on the same networks as Amazon devices. This is a question, we'll start with you Mr. White, but for both you and Mr. McCrate. Some Bluetooth low-energy devices are capable of triangulating the precise location of other Bluetooth-enabled devices. Do any of your products track the location of phones, wearables, or other devices within the home or within the range of a WiFi or a mesh network to which one of your companies' devices may be connected?

Mr. WHITE. Senator, I'm not—I don't think so. I mean, that can get hyper-technical around the triangulation of location. What I can—and I'm happy to follow-up with you on the specifics of that. In fact, I do think there is some technical issues that I would want our team to get you on that question. What I can say, generally, though is that what we aim to do is ensure that users have transparency and control over the data. They can go into their Google account, see what, for example, location data may be stored, and they have controls there to delete that data or dictate how that data is used across our services. What we've done recently is also have auto-delete as kind of an automatic—a default function for users. If users want to make that shorter, they have the controls to do that as well, Senator.

Senator OSSOFF. Okay. Mr. White, thank you. Mr. McCrate, just to restate the question. Do any of Amazon's products track the location of phones, wearables, or other devices within the home or within range of a WiFi or mesh network? I want to add I believe Amazon owns the Aero product, which is a mesh WiFi network product. The question Eero whether you are tracking the location of user devices within homes where your products are present?

Mr. McCrate. Senator, I don't support the Eero business. It's a very important question you're asking, and I will make sure we get you accurate information. I'd be happy to follow-up with your office.

I do understand that when customers connect devices to Eero, which is one of our home router devices, that the Eero would then know which devices are connected so that, again, it can provide and route internet traffic appropriately.

Senator OSSOFF. Thank you, Mr. McCrate. Mr. White, your privacy statements indicate that the company uses data collected from user interactions to develop new products and services, but does not indicate bounds on what kinds of products that data may be used to develop. Do you use the video and image data you collect to develop or train facial or object recognition software or systems?

Mr. WHITE. Senator, if a user decides to have their audio recordings, for example, from the Google Assistant stored on their account, we may use in a very randomized way, we may use some

of that audio recording to help improve our speech recognition technologies. I'm aware of that. A user also has the ability to not have their audio recordings, for example, or the images that's saved on their account.

Senator OSSOFF. I just want to make sure we drill down on the question here with respect to video. Your products which capture video, whether they're digital assistants, communications tools, or security services, do you use the video and image data collected through those tools to develop or train facial or object recognition systems?

Mr. WHITE. Senator, if a user decides to have their video stored on their account, I'm not sure whether that's actually used for our—for machine learning models or not. I'm happy to follow-up with you on those specifics. What we're focused on in ensuring that users have that transparency around how their data is being collected, stored, and used.

Senator OSSOFF. Okay. We'll get you a follow-up on the record so you can answer precisely. I greatly appreciate that, Mr. White.

Mr. WHITE. Thank you, Senator.

Senator OSSOFF. Begging your indulgence, Mr. Chairman, just to direct that same question to you, please, Mr. McCrate. Does Amazon use video or image data collected by your devices to develop or train facial or object recognition systems, please?

Mr. McCrate. Senator, none of Amazon's consumer devices provide any facial recognition features. I'm not aware of any of the data we collect being used in that way.

Senator OSSOFF. Okay. Thank you so much. We'll get you some more precision for the record as well. Grateful to you both for your testimony. I yield back, Mister Chairman.

Chair KLOBUCHAR. Thank you very much, Senator Ossoff. I have returned from my foray into the Commerce Committee.

Senator OSSOFF. Welcome back.

Chair KLOBUCHAR. I will now turn this over. Senator Lee, do you want to go next again? We can go to Senator Hawley, and then I'll end. If there are any other Senators, we'll, of course—please let us know.

Senator LEE. Thanks so much, Madam Chair. Mr. Lazarus, I want to follow-up on a question that you were asked a few minutes ago by Senator Blumenthal. Tell me—are you concerned about Amazon and Google copying ideas and impairing competitors in the same way that we've heard allegations regarding between Apple and Tile, for instance? Tell me about your concerns with that.

Mr. LAZARUS. Thank you for the question. Two sets of concerns. One is that in the certification process that we have to go through with both of those companies, they often extract information that we think is irrelevant to the technical questions of integrating their voice assistance on our products. They learn a lot about our product road maps. They sometimes ask for sales forecasts and that sort of thing. That causes us great concern that what they're looking at what would be a nice product that they might make themselves, and then we get into the cycle of cross subsidization that Senator Hawley and I were discussing.

In addition to that, it's, of course, on the public record, that we believe that both Amazon and Google infringe, you know, roughly

150 of our patents and have taken some of our core technologies to build their smart audio speakers. We do have a lot of concern in that area, and we are very pleased that this Committee is looking at it.

Senator LEE. Mr. McCrate, does Google's control of Android and Apple's control of IOS give those companies an advantage in the smart home space? How does Amazon compete with that?

Mr. McCrate. Senator, I do think there are benefits to controlling the smart home—smartphone devices that customers use. Smartphone devices are, again, the primary way customers access voice assistance today. My understanding is they're also the primary way that customers control their smart home devices. Most smart home devices have applications that customers access through the Google Store or Apple Store, and then can use to set up their lights, control their ceiling fans, et cetera.

I do think the fact that the phones are the gateway that customers use to receive those apps and are the primary way that customers access voice is helpful to Apple and Google.

Senator LEE. What would you do if Google or Apple cutoff Amazon's ability to interoperate with Android or IOS devices?

Mr. T4MCrate. Senator, I think it would be potentially catastrophic. We make a variety of apps available through both Apple and Google, our Amazon Shopping app, our Alexa app, our Prime Video app, our Music app, and those are critical ways that customers access our service on a day-to-day basis.

Senator LEE. Thank you. Mr. White, I've heard that Google wants to be open as possible when it comes to Internet of Things, devices. That makes sense while the market is still growing and while adoption is still on the increase. What about—what happens when the market begins to plateau? Won't it then be in Google's interest to start pushing out rivals by giving preferential treatment to its own devices and to its own services?

Mr. WHITE. Senator, before I answer that question, let me just—let me just note that in Mr. McCrate's previous comment around what would happen with Android operating system, that the Android operating system really is a free and open-source system, and Amazon has actually benefited greatly from that in building their own Fire operating system.

That level of innovation that's come from having an open platform is something that we've already seen in the market. It's something that we think also goes to your question around what happens as this new and evolving space continues to evolve. For us, we're motivated by ensuring that we're staying on the cutting edge of giving consumers the information they seek and helping them in those moments that matter. Users trust us—

Senator LEE. Google does control the store. I mean, it controls the store. Right?

Mr. WHITE. We have the Google Play store, which is our proprietary app store in the Android ecosystem. There are other app stores, and we allow other app stores on android, including Amazon's app store. It's really in our interest, and have demonstrated interest, to ensure that many people are playing in this space, because that's procompetition. That's proconsumer. We've seen the benefits of that with the Android model.

Senator LEE. Okay. I want to ask you, and I'm going to ask a similar question in a moment of Mr. McCrate. I frequently see that your company's—your respective companies literally give away your smart speakers for free. How do you make money off of that?

Mr. WHITE. Senator, there is multiple ways of generating revenue from our devices and services, including things like licensing fees, subscriptions, selling devices directly, and in this space, it's a very competitive space. You have several players who are competing in the smart home space.

Microsoft's Cortana. Amazon's Alexa. Samsung's Bixby. Apple's Siri. The Google Assistant. New players that are getting into the space as well: Spotify getting into the voice assistant space. Sonos recently purchasing a voice AI company. It's a very active, vibrantly competitive space, but it's still very new.

Senator LEE. Sure. I get that. It's an active, vibrant space. You still have to make money off of it. I assume you make money off of it by encouraging use of it. Sort of analogous of what happens with video game consoles. Is that fair to say?

Mr. WHITE. Cellular devices, encouraging use of it. Competing for promotional opportunities. Licensing fees. It's a multitude of ways that we are exploring in terms of generating revenue for this business.

Senator LEE. Do you think giving away those devices undermines competitions?

Mr. WHITE. No, Senator. I do not. I think we compete vigorously for promotional opportunities. That's a very common thing in the hardware industry, and we think that we're very much in line with the many competitors that we see in this space.

Senator LEE. Mr. McCrate, what about Amazon? How do you make money off of giving away speakers?

Mr. MCCRATE. Senator, if I could—I'm not aware of any instances where we have given away speakers. We are proud of the low prices that we are able to offer customers on our speakers.

That takes a lot of work. We focus on building quality devices at as low of a cost as we can so we can price them competitively. We're often not the cheapest devices in the marketplace, and we frequently have to discount our devices to price match others.

Senator LEE. Do you think it would—

Mr. MCCRATE. Mr. White pointed—

Senator LEE [continuing]. Undermine competition if you were to give them away?

Mr. MCCRATE. Senator, I can't say in all cases that it would. Just as an example, there are many different business models that companies pursue. Building on the comment Mr. White had, Spotify recently announced a hardware device that they've made available with their own voice service to allow customers to access streaming music content.

My understanding is that they are giving that device away, and then charging a subscription fee for customers to use it. We think allowing customers to innovate in the business models is proconsumer and that lowering prices is proconsumer.

Senator LEE. Mr. Lazarus, what's your view on whether giving away speakers undermines competition?

Mr. LAZARUS. It really depends on the circumstance. The point here is that they're cross subsidizing. It's one thing to have a business model within the same market where the device is not the way in which you're getting your profits. It's another to take your profits from your dominate platform and subsidize your devices so that you create a virtuous circle when then feeds back into your dominant platform, and that's what we believe is going on in this market.

Senator LEE. Thank you. Thank you, Madam Chair.

Chair KLOBUCHAR. Very good. Thank you, Senator Hawley.

Senator HAWLEY. Thank you, Madam Chair. If I could just follow-up, Mr. White, on that same point. Can we talk about the Nest unit for just a second? Have you ever sold that product to consumers at below cost?

Mr. WHITE. Below?

Senator HAWLEY. Below the cost it takes you to manufacture it.

Mr. WHITE. Yes. I don't know the answer to that, Senator, because we don't break down profitability by product area. I'm happy to have our team follow-up with you on the details of that. I just don't have those numbers here.

Senator HAWLEY. They do exist, though. Right? I mean, you do know whether or not you have at any point—Google has at any point sold that product at below the cost to make it. That exists, presumably.

Mr. WHITE. I actually personally, Senator, do not know. I'm happy to follow-up with you.

Senator HAWLEY. Great. Okay. Thank you. I'd like to see the number. I noticed that Mr. McCrate said that indeed Alexa had been sold at below cost. I'd be shocked if Nest hasn't. I just want to come back to the point that Mr. Lazarus didn't—just made, which is my real interest here, is in cross subsidization. Let me just ask you a version of the question that Senator Lee asked you. If you, indeed, have sold the Nest unit at a price below cost to customers and have done that in order to undercut a competitor, that's anticompetitive conduct. Right? Wouldn't you agree with that?

Mr. WHITE. Senator, as I said, I don't know whether we've sold devices at cost, but what I can say is that this is a competitive space. We price our products in a competitive way along with the other devices that are in this space.

Senator HAWLEY. Let me ask you about a report that Google released last year entitled, "Think with Google." It was a—Think with Google report, rather. It was entitled, "Connecting the Dots: Five Consumer Pain Points Stalling the Connected Home of the Future." In the report, the authors said that, "Consumers want seamless integration." They went on to say, "The smart play for industry players is to find ways to provide consumers with unified access to different content and service providers, consider building partnerships with other companies to let people access all of their devices and all of their apps from one ecosystem." Is Google doing that now? I mean, currently, does Google provide unified access to competitor services through your smart home products?

Mr. WHITE. Senator, right now what we're doing is learning in this very new and evolving space. We're working with partners across the board. For example, we work with over 2,000 device

makers who are bringing their devices online as part of the connected devices evolution. We're partnering with industry players, big and small, on questions around a secure connectivity standard. We're very active in the industry here, and evolving as this industry evolves.

Senator HAWLEY. Does that mean that you—is that no? Or does that mean you don't know? I mean, it didn't sound like yes to me. Are you saying that you currently don't provide access to competitor devices on your system? Or do you not personally know the answer to that?

Mr. WHITE. There are examples of that, Senator, on some form factors. I'm trying to paint a picture that this is very much an evolving space. It's diverse. For example, on the Google Assistant, if a user wants to play music on the Google Assistant, at setup, they can actually choose a default music provider. We have partnerships with providers like Spotify, like Pandora. If a user chooses one of those partners, when they give the command to the Google Assistant to play music, we'll honor that default choice by the user. That's just one example. This is an evolving space, and we'll continue to work with partners as we integrate more actions on Google.

Senator HAWLEY. I'll give you this question for the record so maybe we can get some more precision on it. I'm asking because some journalist reports, for instance, from just a few years back, as recently as 2017, wrote that you could connect, for instance, your Apple Music subscription to your Google home speakers, but you couldn't tell the speakers to turn the volume down or to change tracks.

The Google speakers could be used to order an Uber or understand the command to repay Netflix, but if you wanted to order a toothbrush off of Amazon, then you were out of luck. Google home products were not very compatible with competitors. Again, that was as of 2017. What I'm really driving at here is, are you giving your competitor services equal levels of functionality to your own services that are offered in the same market? Can you answer that for me?

Mr. WHITE. I think that's exactly—yes. Yes, Senator. I think you're getting at the question of interoperability that we were talking—

Senator HAWLEY. Right.

Mr. WHITE [continuing]. With Senator Klobuchar and other about earlier. That is an evolving area. It's a robust conversation that the industry is having at a technical level, and we are participating in that. We hope that over time, we will see more and more of that level of interoperability between the broad range of smart home ecosystems.

Senator HAWLEY. Okay. I'll tell you what, I'll give this to you for the record because I'd like to drill down on that—that's a very aspirational statement. I'm sure the market is evolving. I think it would be helpful for us to have an understanding of what you're doing right now so that we could see what your current practices are, and measure those against what other competitors and rivals are claiming. We'll put this in writing and see if we can't get a little more precise answer.

Thank you, Madam Chair.

Mr. WHITE. Thank you, Senator.

Chair KLOBUCHAR. Okay. Very good. Thank you. I want to put a letter on the record. We received a letter from George Slover at Summit Charma Consumer Reports in connection with this hearing. I seek unanimous consent to enter it into the record, without objection?

[The information appears as a submission for the record.]

Chair KLOBUCHAR. All right. Mr. White, one of the concerns that has been raised is that companies like Google have the power to exclude competing voice assistants. I've heard that Google limits the ability of other voice assistants to exist concurrently with the Google Assistant on its connected home systems. That could prevent competing general purposed voice assistants, and even special purpose voice from competing at all. Why not let other voice assistants operate alongside Google Assistant?

Mr. WHITE. Senator, in some areas, we do. As I've said throughout the conversation today, it is an evolving area. For example, on some Samsung phones, we have the Bixby Assistant alongside the Google Assistant. This question around concurrency—

Chair KLOBUCHAR. Is that just in those specific Samsung phones? Or do you do it routinely, then, where you allow another voice assistant to operate concurrently?

Mr. WHITE. I don't think that's the case on every device, but there are different ways of achieving this idea of concurrency. For example, on one of the Sonos speakers, you have both Alexa and you have the Google Assistant. What we require in that area is for the user to manually decide which assistant they're interacting with because we're trying to balance the interoperability with other things we care about, which is the user experience, mitigating user confusion, privacy, security. That's the area that we're still working in and innovating in.

There are some technical challenges around having two voice assistants that are listening at the same time. What happens if a user asks one assistant to turn the lights on, and another assistant to turn the lights off? How are those two assistants working together? There's some technical challenges there that I think the industry will have to work out. We're not there yet, but we're actively engaged in those conversations.

Chair KLOBUCHAR. Okay. That's a good segue to Mr. Lazarus. I'm interested in your thoughts. Sonos recently invested, I understand, in voice assistant technology. What do policies that prevent concurrent operation of more than one voice assistant due to your incentives to further develop that technology? I think that Mr. White mentioned the Samsung example. What's been your experience?

Mr. LAZARUS. Google contractually forbids us to have concurrency between Google Assistant and Alexa on our speakers. Period. Full stop.

We have the technology that solves the problems that he described. We've offered to demo it for him—not for him, but for Google. We've demoed it for any number of other regulators around the world and this country, and we'd be pleased to demo it for this Subcommittee so you could see what a great consumer experience

it would be. We would encourage Google to allow us to bring that consumer innovation to market.

That's just an example. There's all kinds of—you need companies that are Switzerland-like companies that sit at the intersection of all of these major ecosystems, and that's the kind of interoperability we need; and we hope that in reforming the laws that will set some rules of the road that allow for that.

Chair KLOBUCHAR. Very good, Mr. Lazarus. I don't know if you've done research since I'm half Sylvanian, as noted by Senator Lee, but I'm half Swiss. Thank you very much for bringing this up.

Mr. White, how would you—how would you respond to what Mr. Lazarus just said that he would love to do this? He'd love to demo it. He'd love to show it. Just concerns that this is, you know, eliminating the incentives of a number of companies to develop voice recognition technology because it sounds like the modus operandi for the most part is not to allow concurrence, even though you did illustrate one example?

Mr. WHITE. Yes. I gave you that one example. Senator, it is early days. Mr. Lazarus, early in my career, I was an engineer, so I'd love the opportunity personally to see the demo, aside from the question—the policy conversation that we're having here.

It is an evolving space, Senator Klobuchar, and we're working through those issues. There has to be a conversation around the consumer protection issues, around privacy, security, consumer confusion, and the consumer experience itself. Today, this idea of having a user have the ability to manually switch between the voice assistants, that exists today. That switchability exists today. You have two assistants on the same device.

This will evolve. I think as we are balancing those various factors, we will get to a place where we're bringing more innovation to consumers and more benefit to consumers. We look forward to continue to innovate in this space.

Chair KLOBUCHAR. Mr. Lazarus, could we turn to some solutions to this? You mentioned my legislation in your written testimony. We've talked about enforcement resources here, and I'm not as focused on that right now in this question, and there have been a number of tech bills introduced in the House. As I mentioned, we're working on those in the Senate. Senator Lee and Senator Grassley have a bill. Senator Hawley's worked on this. Really all the Members of the Committee have been very busy working on solutions. Do you think antitrust reform proposals would be helpful to address some of the issues we've discussed today and could contribute to the development of a more open and competitive connected home technology market? What exactly would be helpful?

Mr. LAZARUS. There's no question about that, Senator. It would be enormously helpful. The bipartisan House bill that addresses interoperability has some terrific language in it that goes right to the kinds of questions we've been talking about here. We'd also welcome reform of the predatory pricing standard to get at the issue of cross subsidization that Senator Hawley was focused on. The current doctrine that's been developed over the last 20, 30 years at the Supreme Court has a recoupment rule that doesn't—

Chair KLOBUCHAR. Yes. I'm aware. Yes.

Mr. LAZARUS [continuing]. Doesn't work appropriately, and also, really doesn't have the right formula for calculating price for a software environment where the marginal costs of software is basically zero. We'd really welcome reform in that area as well as just generally the nondiscrimination kinds of proposals that you've been looking at. You know, a golden rule in this area would be great.

Chair KLOBUCHAR. Okay.

Mr. LAZARUS. Treat others as you treat yourself.

Chair KLOBUCHAR. Very good. I'd say that was a nice way to end. I have one more question. Professor Zittrain, according to your written testimony, you also support reforming the antitrust laws. What do you think would be helpful in the market?

Professor ZITTRAIN. I think that looking at just the exchanges that have happened, to whatever extent the law can help take what is currently a business development exercise, subject to all of the dross and the deals that are about that on whether one assistant is going to connect with Pandora. You know, is Pandora paying them because they want to get to the users? Or are they paying Pandora because they really want to become a popular assistant?

To the extent that that can be transformed into more of a commics. This is kind of the Switzerland line of talk. I think that would be great. Some of the provisions in your own bill that are more generally about antitrust, I think, could be extremely helpful in that area. Mr. Lazarus already talked about the ways in which the courts, perhaps understandably in other areas, have really focused on absolute certainty about risk, about having to demarcate damages, where in these realms, that might be a lot harder to do. To be able to have standards that allow regulators, in support of a free market rather than against it, to do their work, that seems to be extremely helpful.

I just also want to note the way in which sometimes some of the many valid concerns about privacy that have been raised today. In my own testimony, I considerably said we can have a privacy apocalypse here. Some of those concerns about privacy are about asking the big players not to be sharing their data. Under the same breath, we're asking them to make sure that any data they make use of daunt the would-be competitors have use of that too. Figuring out how to square that circle is a big part, I think, of how to get policy right in this area.

Chair KLOBUCHAR. Okay. One thing we haven't mentioned much is Apple also offers connected home products, including the well-known voice assistant, Siri. Of course, Apple has a different approach than Amazon and Google that is more focused on integrating its own Apple-branded devices and generating revenue from device sales and digital services rather than data and advertising. It seems that Apple's connected home devices and services are actually less interoperable, perhaps by design. Mr. Lazarus, in your opinion, does Apple's approach to the connected home raise competition concerns as well?

Mr. LAZARUS. I think it all boils down to the same issue. Are we going to have a smart home market that is dominated by just a couple of players? Apple has its strategy. If you want to be a third-party licensing Siri, you have to actually accept a home pod into the house, which is a competing product.

Yes. Lots of competitive concerns about that. In the macro, I would just say it's all part en parcel the same thing. Siloed ecosystems of a few dominate players is not the best way to organize the smart home market.

Chair KLOBUCHAR. Professor Zittrain, really briefly. Is Apple's walled garden approach to the connected home preferable to Amazon's and Google's more open approach? Or do they just raise different types of concerns?

Professor ZITTRAIN. It raises different types of concerns, and we can do better than that. I am completely sympathetic to what you would hear from Apple if they were here today, that their, "It just works. It's seamless," kind of consumer experience is made possible because of the care they exercise in tightly integrating where they want to, their stuff.

I was, in preparation for this hearing, trying to figure out if I could make the Google Assistant the default on my iPhone. It turns out that with enough clicks and about 6 hours of time, I could probably have it so that I could go, "Hey, Siri, hey, Google, what's the weather," and literally Siri would ask Google to ask the weather what the weather is and then pass it back to Siri to me.

No. We can do better than that. The law, I think, needs to provide it. I think just asking these companies to kind of be more—have elbows that are less sharp, they are competitors. They're trying to compete. They owe to their share-holders that duty. Let's set up the rules so that they know how to play to the chalk, but not go beyond it.

Chair KLOBUCHAR. Yes.

Professor ZITTRAIN. It's time to redraw some of those lines.

Chair KLOBUCHAR. Okay. One last question on ads. September, we covered this in various ways with Google in the past in a previous hearing that Senator Lee had in another context. A September 2020 article in the Wall Street Journal examined how Amazon restricts the ability of competing smart home devices such as smart doorbells and video-streaming devices to actually advertise on Amazon.com. Specifically, the Journal article said that Amazon won't let competitors buy sponsored product ads tied to search for Amazon devices such as Echo speakers and Ring doorbells. Mr. McCrate, does Amazon restrict competitors from advertising their connected home devices on Amazon.com, including on sponsored products ads tied to searches for specific devices?

Mr. McCrate. Senator, that's a very important question. I want to make sure we're getting you accurate information.

Chair KLOBUCHAR. Okay.

Mr. McCrate. I don't support the sponsored ads part of business, but I'd be happy to follow-up with those details.

Chair KLOBUCHAR. Okay. Very good. Thank you. We look forward to that answer. Mr. Crawford, one question of you, because I didn't ask one. Then I'll see if Senator Lee has any other questions.

I think we know that the fight against monopoly powers more than just lower prices. It's about freedom of individuals and our democracy. You mentioned some of this before. What can we do to prevent digital monopolies from undermining the democratic process?

Mr. CRAWFORD. The million-dollar question. I'm not an expert in how to solve problems with legislation. I just—by way of an example of the problem, you know, the Nest with the thermostat sold by Google. Legal scholars who looked into this discovered that to enter into this knowingly, you'd have to review almost 1,000 separate contracts. Of course, hardly anyone reads even one such contract, and perhaps they're counting on that. That raises the issue of asymmetry of information, which economists tell us is fatal to a free market.

Another thing that's not supposed to happen in a free market is hostage taking. The Nest—the terms of service stipulate that if you don't agree to all the data gathering, you could suffer from frozen pipes, failed smoke alarms. The basic functions that you're looking for, that you think you're paying for, are held hostage to the submission of data. These functions are enmeshed in this tangled web of services and software. The basic idea of a free market is that you're free to vote with your feet and go elsewhere. If the exit costs are that high in hassle, well, it's not likely to happen.

Thank you.

Chair KLOBUCHAR. Okay. Thank you. Senator Lee.

Senator LEE. Mr. Crawford, so how would you respond to critics who might say, in response to your point, that a company like Facebook can end up starting to resemble a rival government? How would you respond to those who would say, "Yes. But Facebook can't—unlike the government, it can't force you to do something at the point of a gun."

Mr. CRAWFORD. Right. There's no coercion. There are no thumb screws applied at any point. It becomes a matter of every aspect of life being ordered by a handful of firms. As you know, these firms are now—you know, their market caps are in the trillions. At some point, the concept of government, I think, has to be extended beyond these halls to entities that have such far-reaching control and sort of penetration into our lives.

Senator LEE. You might say that that's the sort of response you'd expect in a Stockholm Syndrome sort of situation.

[Laughter.]

Senator LEE. Is that your point that the fact that they're not behaving as a government, the fact that they're not literally requiring you to do it at the point of a gun doesn't mean that there aren't things that are happening that are anticompetitive or—

Mr. CRAWFORD. With technology, we often say that it's all optional. There's a sort of tipping of the entire society into dependence on certain things, certainly platforms such that just as a kind of subjective experience, it certainly doesn't feel optional. Can you not have a smartphone? Maybe, but life would be kind of hard. It's a matter of sort of conditioning what's possible. That happens—it doesn't happen through legislation. It happens through these kinds of consolidations of economic power.

Senator LEE. Got it. Thank you.

Chair KLOBUCHAR. Okay. Very good. Well, thank you. This has been enlightening; and I think we're going to have a number of follow-ups, as some of the Senators have mentioned with follow-up questions. I think, as I said at the beginning of the hearing, we're a bit ahead of ourselves than we were, where we're not looking

backward at some of the other issues and raised—that have been raised in the tech industry.

I think the work we're doing with regard to those issues is going to, for certain, include some of what we've learned today as we look at this major marketplace in tech as part of the areas where we're going to have to draft bills and pass bills, and have our enforcers enforce in this area, and think ahead of themselves when it comes to tech legislation. Even what I would like to see, of course, and I know Senator Lee is interested in this as well. Other pieces of legislation that even go beyond tech that could make it easier to bring these cases and look at what's happened in certain industries. That's what we're about right now.

I've actually been really pleased about the bipartisan work that went on in this Committee, in the Judiciary Committee a few weeks ago, and my bill with Senator Grassley. I'm pleased about the bipartisan work going on in the House. I just talked to Representative Buck. I know he's a friend of yours, Senator Lee, last week. It's just time to get moving. We're ready to go.

Thank you very much to the witnesses, both here and remote. We look forward to following up with all of you. Thank you. This hearing is adjourned.

[Whereupon, at 4:49 p.m., the hearing was adjourned.]

[Additional material submitted for the record follows.]

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Testimony before the U.S. Senate Judiciary Committee, Subcommittee on Antitrust,
Competition Policy & Consumer Rights

Matthew B. Crawford

June 15, 2021

Consider the appeal of a home in which your thermostat, your lights, your refrigerator, your Sleep Number mattress, your security system and everything else is networked together, connected to the Internet, and orchestrated by a kind of household manager who may go by Alexa or some other name. The appeal, surely, lies in not having to do things that we normally do for ourselves. The convenience may be worth the price; that's for each of us to decide. But to do so with open eyes, one has to understand what the price is. After all, you don't pay a monthly fee for Alexa, or Google Home. The cost, then, is a subtle one: a slight psychological adjustment in which we are tipped a bit further into passivity and dependence.

The dependence arises from the fact that all of these devices will be integrated and work together "seamlessly", as they say. One problem, from an anti-trust perspective, is that the more interconnected everything is, the more seamlessly it all works together, the higher the cost of wrenching yourself free of the whole apparatus. It is a cost you will pay not in money but in *hassle*, and this is significant. If the "exit costs" are high enough, you don't need an actual monopoly to get monopoly behavior.

The Sleep Number Bed is typical of smart home devices. It comes with an app, of course, which you'll need to install to get the full benefits. Benefits for whom? Well, to know that you would need to spend some time with the 12-page privacy policy that comes with the bed. There you'll read about "third-party sharing, Google analytics, targeted advertising," and much else. The contract specifies that the company can share or exploit your personal information even "after you deactivate or cancel ... your Sleep Number account." You are unilaterally informed that the firm does not honor "Do Not Track" notifications. By the way, the bed also transmits the audio signals in your bedroom. (I am not making this up.)

Nest is a company that makes a "smart" thermostat for your home. It was incubated at Google and is owned by Google's parent company, Alphabet. Legal scholars who analyzed everything you agree to when you use the Nest thermostat and its ecosystem of apps and devices concluded that, to do so knowingly, you would need to review nearly a thousand separate contracts. Of course, hardly anyone reads even one such contract; perhaps they are counting on that. This raises the issue of "asymmetry of information" which, as any economist will tell you, deeply compromises the working of a free market.

Another thing that is not supposed to happen in a free market is hostage-taking. The Harvard business school Professor Shoshana Zuboff writes that if the customer refuses to agree to all the stipulations of the Nest system, "the terms of service indicate that the functionality and security of the thermostat itself will be deeply compromised. . . . The consequences can range

from frozen pipes to failed smoke alarms to an easily hacked internal home system. In short, the effectiveness and safety of the product are brazenly held hostage to its owners' submission to the collection of data for others' interests. In the business model of smart devices, "the simple product functions that we seek are... hopelessly enmeshed in a tangled mixture of software, services, and networks."

This entanglement makes the "right of exit" somewhat abstract, as a practical matter. Let's remind ourselves that a crucial premise of the free market is that if you're not happy, you can vote with your feet and go elsewhere.

The business rationale for the smart home is to bring the intimate patterns of life into the fold of the surveillance economy, which has a one-way mirror quality. Increasingly, every aspect of our lives – our voices, our facial expressions, our political affiliations and intellectual predilections – are laid bare as a data to be collected by companies who, for their own part, guard with military-grade secrecy the algorithms by which to use this information to determine the world that is presented to us, for example when we enter a search term, or in our news feeds. They are also in a position to determine our standing in the reputational economy. The credit rating agencies and insurance companies would like to know us more intimately; I suppose Alexa can help with that.

Allow me to offer a point of reference that comes from outside the tech debates, but can be brought to bear on them. Conservative legal scholars have long criticized a shift of power from

Congress to the administrative state, which seeks to bypass legislation and rule by executive fiat, through administrative rulings. The appeal of this move is that it saves one the effort of persuading others, that is, the inconvenience of democratic politics.

All of the arguments that conservatives make about the administrative state apply as well to this new thing, call it algorithmic governance, that operates through artificial intelligence developed in the private sector. It too is a form of power that is not required to give an account of itself, and is therefore insulated from democratic pressures.

For reasons intrinsic to machine learning, the logic by which an AI reaches its conclusions is impossible to reconstruct even for those who built the underlying algorithms.¹ We need to consider the significance of this in the light of our political traditions.

When a court issues a decision, the judge writes an opinion in which he explains his reasoning. He grounds the decision in law, precedent, common sense, and principles that he feels obliged to articulate and defend. This is what transforms the decision from mere fiat into something that is politically *legitimate*, capable of securing the assent of a free people. It makes the difference between simple power and authority. One distinguishing feature of a modern, liberal society is that authority is supposed to have this rational quality to it—rather than appealing to,

¹ In “machine learning,” an array of variables are fed into deeply layered “neural nets” that simulate the binary, fire/don’t fire synaptic connections of an animal brain. Vast amounts of data are used in a massively iterated (and, in some versions, unsupervised) training regimen. Because the strength of connections between logical nodes is highly plastic, just like neural pathways, the machine gets trained by trial and error and is able to arrive at something resembling knowledge of the world.

say, a special talent for priestly divination. This is our Enlightenment inheritance. It appears to be in a fragile state. With the inscrutable arcana of data science, a new priesthood peers into a hidden layer of reality that is revealed only by a self-taught AI program—the logic of which is beyond human knowing.

The feeling that one is ruled by a class of experts who cannot be addressed, who cannot be held to account, has surely contributed to populist anger. From the perspective of ordinary citizens, the usual distinction between government and “the private sector” starts to sound like a joke, given how the tech firms order our lives in far-reaching ways.

Google, Facebook, Twitter and Amazon have established portals that people feel they have to pass through to conduct the business of life, and to participate in the common life of the nation. Such bottlenecks are a natural consequence of “the network effect.” It was early innovations that allowed these firms to take up their positions. But it is *not* innovation, it is these established positions, and the ongoing control of the data it allows them to gather, that accounts for the unprecedented rents they are able to collect, as in a classic infrastructure monopoly. If those profits measure anything at all, it is the reach of a grid of surveillance that continues to spread and deepen. It is this grid’s basic lack of intelligibility that renders it politically unaccountable. Yet accountability is the very essence of representative government.

Mr. Zuckerberg has said frankly that “In a lot of ways Facebook is more like a government than a traditional company.” If we take the man at his word, it would seem to raise the question: can the United States government tolerate the existence of a rival government within its territory?

In 1776, we answered that question with a resounding “No!” and then fought a revolutionary war to make it so. The slogan of that war was “don’t tread on me.” This spirited insistence on self-rule expresses the psychic core of republicanism. As Senator Klobuchar points out in her book *Antitrust*, the slogan was directed in particular at the British Crown’s grant of monopoly charters to corporations that controlled trade with the colonies. Today, the platform firms appear to many as an imperial power. The fundamental question “who rules?” is pressed upon this body once again.

Thank you.

SONOS

Written Testimony of Eddie Lazarus

Chief Legal Officer, Sonos, Inc.

Senate Committee on the Judiciary
Subcommittee on Competition Policy, Antitrust, and Consumer Rights
June 15, 2021

I'd like to thank Chair Klobuchar, Ranking Member Lee, and distinguished members of the subcommittee for the opportunity to appear before you.

It is an honor to testify as the Chief Legal Officer of Sonos, a hugely innovative company whose history — from small startup to multibillion-dollar global enterprise — embodies American tech innovation at its best.

Sonos was founded in Santa Barbara, California in 2002 by a handful of entrepreneurs who set out to reinvent home audio for the digital age. What Sonos's founders imagined was a world where the old home audio systems — featuring passive speakers connected by wires to a centralized receiver/amplifier — would be replaced by a well-designed and seamless experience where users could play music on wireless speakers that communicate with each other to produce what is known today a multiroom home audio.

Many companies now tout how they let you stream the same music to different speakers in different rooms of your house, or stream different music to different rooms, or play music at different volumes in different places, or pair speakers in stereo. Years before the Amazons and Googles thought about home audio, Sonos invented and patented each of those delightful features of a modern home audio system — and many other cool features too. In this way, Sonos was putting "smarts" into the home years before the idea of a "smart home" became a part of the lexicon. Our innovation is reflected in our portfolio of over 1,000 patents issued in the U.S. alone, a number that continues to grow every year as we invest heavily in new audio experiences.

Sonos's innovative culture has served it well. Today we employ roughly 1,500 people (mostly in the U.S.), and our products have been welcomed into more than 11 million homes. Over the past year, we introduced our category-leading soundbar in Sonos Arc, our ultraportable, weatherproof Bluetooth speaker in Sonos Roam, and a new collaboration with the carmaker Audi. We've grown our customer base, product portfolio, and revenue every year since our founding, and nearly three years ago the company went public.

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Our success is based in significant part on elevating the idea of an open platform facilitating consumer choice rather than a walled-garden experience. Sonos customers can choose audio content to play on our systems from more than 100 streaming services, such as Spotify, Deezer, Tidal, Apple Music, Amazon Music, and Google's YouTube Music. They can also choose between one of the two leading voice assistants, Amazon's Alexa, and Google Assistant. Moreover, we provide these services with a strong emphasis on quality and privacy, focusing on using customer data to enhance their experience rather than aggressive monetization.

Sonos had the good fortune of disrupting home audio, building its brand, and developing financial resilience before the huge tech players sought to dominate the smart speaker space. That puts us in a stronger position than most companies to speak out about the existential threats to continued innovation and fair competition. And speak out we must. The battle for the future of the smart home is upon us, and we very much welcome this Committee's attention, as Congress can play an extremely salutary role in determining what that future will look like.

We see two possible futures for the smart home. In the first scenario — resulting from the current trajectory we're on — every smart home will be controlled by one of a few dominant companies, Google, Amazon, or perhaps Apple or Facebook will squeeze in too. These behemoths will exert overwhelming control over the direction of innovation and what new ideas make it to market, ultimately replicating a market structure that history tells us inhibits innovation and competition. Consumer choice will also wither. Consumers will find themselves channeled into the siloed ecosystems of a Google or an Amazon in a self-reinforcing dynamic of network fueled dominance.

In an alternative scenario, revamped antitrust law and enforcement level and broaden the playing field. The second future is one in which companies like Sonos and countless others innovate and bring novel experiences to customers. A multitude of companies will compete based on the merits of their products and services, with the best ideas rising to the top. Consumers will enjoy greater choice not merely to choose alternatives to the systems provided by the dominant companies, but also to mix and match seamlessly among their and other offerings. We believe that Congress has a vital role to play in determining which future we create. Due to strong network effects, technology markets can tip quickly. So time is short.

Why Smart Home Matters: It is the gateway to the internet and a gold mine for data

Generally speaking, in a smart home, a set of front-end, consumer-facing control devices, such as control consoles, phones, or smart speakers, serves both to connect the home to the internet and also to provide a control interface for back-end "workhorse" devices, like lightbulbs, HVAC systems, and alarms. Consumers have already integrated many smart systems into their homes, and that trend will continue to accelerate rapidly in the coming years.

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For Google and Amazon specifically, the smart home — this new and growing interface between their online enterprises and consumers — presents both a threat and an opportunity. The threat is that if other companies were to be successful in the smart home space -- and in particular if they were successful with controller devices that connect directly to the internet -- they might stand between the dominant companies and customers. The opportunity for these companies is to dominate yet another important consumer market and, even more critically, to use their smart home systems to collect vast amounts of consumer data which can be monetized on their already dominant and enormously profitable platforms.

As it happens, the stickiest product in the smart home space is the voice-enabled smart speaker. One reason for this is that people love music and often use smart speakers for that purpose. Spread around the house, such speakers also give consumers easy access to the internet (for example, to check the weather or ask a question) without being tethered to a device such as a phone.

This is where Sonos comes in. Sonos introduced voice-enabled smart speakers in 2017 through our integration with Amazon Alexa on the Sonos One, and we followed up two years later by featuring Google Assistant on our products. The ability to serve as a host for voice assistants makes Sonos's devices an important access point for search and e-commerce services, especially in the future. As a result, we have firsthand experience regarding the strategies that the dominant digital platforms use to prevent that from happening. We would divide those into three categories: 1) cross-subsidization; 2) denial of interoperability and product tying; and 3) leveraging dominance and data. I'll address them in turn.

Cross-subsidization to achieve market dominance

A common strategy of Google and Amazon is to take on a competitor by producing and then flooding the market with similar (I might say copycat) products sold at highly subsidized prices or even given away for free. Anyone who has followed the smart speaker space for the last few years has borne witness to this practice. Indeed, at least of one those companies has stated on the congressional record that the products themselves are money losers. But Amazon and Google, in contrast to Sonos or other smart speaker makers, can afford to lose money on the speaker products because they aren't counting on profits from the product sales themselves. Instead, they make their money by protecting the dominance of their monopoly products and from the rich trove of personal data that these microphone-enabled products vacuum up from consumers. The speakers are mostly just a conduit to their dominant advertising and e-commerce platforms — and so they can take the profits from those platforms and subsidize the speakers themselves.

Amazon and Google have now come to control roughly 85% of the U.S. smart speaker market. This is terrible for innovative dynamics because it hamstring those companies that have better products that cannot be sold at a loss and consumers lose. In addition to protecting the future profits of their dominant products and services, cross-subsidization ultimately will result in the

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same anticompetitive effects as “traditional” below-cost predatory pricing; prices are sure to go up once these dominant companies have driven the other companies out of the market and reduced competition.

The problem is a familiar one from other settings. Take the example of Gmail and Google Photos. Google attracted hundreds of millions of customers to Gmail by offering it for free, wresting away email from email providers who competed on a variety of features. It did the same with Google photos. In 2019, once a number of competitors had tanked, Google began charging Gmail customers who “exceeded” their storage limit.¹ In the same vein, just this month, Google announced it would charge for Google Photos. Now these customers are effectively locked into these services, and Google has not surprisingly generated a lucrative recurring revenue stream, estimated at billions of dollars a year.

True interoperability is essential to competition

The problem of cross-subsidization is compounded by restrictions on interoperability. The strategy of each of the dominant players is to aggregate demand on its own platform — to make a smart home a Google (Nest) home, or an Amazon (Echo) home, or an Apple (HomeKit) home — or at a minimum to draw customers into their ecosystems as much as possible. They lure you into the walled garden with the subsidized prices, and then they want to lock you in. Sonos, like many other innovators, wants to offer a different model: one that interoperates with each of the dominant players, but also unlocks consumers by enabling them to discover and choose from various other products and innovations.

The dominant players often make that difficult if not impossible. To take one egregious and anti-consumer example, Sonos has developed the technical ability to host multiple voice assistants on its smart speakers simultaneously, which we call voice concurrency. Voice concurrency allows for multihoming, whereby consumers would have the ability to call upon whichever voice assistant they want (including more than just the two dominant assistants), and the system will channel them into their chosen service automatically. This is a feature that customers told us they wanted and which requires complex engineering, and we worked hard to invent it. But Google demanded as a condition of having Google Assistant in our products that we never allow concurrency with another general voice assistant. As a result, today Sonos customers must open an application and manually choose which single voice assistant will be configured on their device. This forced choice degrades the consumer experience, but it is arguably good for Google, which is betting that most users will choose Google Assistant as the default voice assistant and then stick to the Google ecosystem.

Nor is Google alone in limiting interoperability. Take Apple’s announcement that it will now license Siri to third parties in the smart home. As reported in *The Verge*, Apple will only license

¹ "Gmail hooked us on free storage. Now Google is making us pay", Gerrit de Vynck, Los Angeles Times, October 24, 2019. Available at: <https://www.latimes.com/business/story/2019-10-24/gmail-hooked-us-on-free-storage-now-google-is-making-us-pay>

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Siri to companies that utilize the HomePod as a central hub to connect with Siri.² Thus, Apple is conditioning interoperability with Siri on companies placing a competitive Apple product alongside their own.

No doubt the dominant companies will suggest that new legislation is unnecessary in light of the initiatives they have underway — like the “Matter” alliance³ — that are working towards a degree of smart home standardization to facilitate interoperability. It may well be that these efforts will yield some positive results for the makers of back-end devices, such as light bulbs, garage door openers, and the like by enabling them to interoperate with any of the three major ecosystems (Alexa, Assistant, Siri) using a uniform code base. But count me a skeptic that these types of initiatives will foster consumer choice at the front-end — where consumers control their smart home devices — or do much, if anything, to foster genuine interoperability across the siloed ecosystems of gatekeepers. From the user’s perspective, the choices among a very few walled gardens will likely remain the same. One could imagine, furthermore, a Trojan Horse aspect to all this. Those who control the standard and its evolution effectively control the nature and pace of innovation, including the innovations dreamed up by their competitors. The standard Matter is working on, as I understand it, is basically a creature of Google and Apple code. That is hardly a formula for fair competition or more creative invention. It’s a formula for further entrenching the dominance of the very few.

Leveraging dominance and data to inhibit rivals

It is also important to appreciate the competitive imbalance that already exists between the dominant players and other participants in the smart home space. Google operates an irreplaceable platform for advertising, controls one of the two dominant voice assistants (Google Assistant), controls one of the two dominant mobile operating systems our products operate on (Google Android), offers office productivity tools, and provides a popular music service (YouTube Music), among other products. Amazon is far and away the most important e-commerce channel, it runs one of the fewer and fewer viable, large-scale cloud services platforms (AWS), it owns the other dominant general voice assistant (Amazon Alexa), and it too has a popular music service that it ties to other services (Amazon Prime Music), among other products. Given these companies’ sprawling empires, one has to do business with them. They are like platforms or basic infrastructure. In many respects, the relationships are productive and mutually beneficial, as these firms also value access to Sonos’s large and growing customer base.

To gain access to their platforms and integrate with their services, these companies issue all manner of take-it-or-leave-it demands, from early and technically detailed access to our product

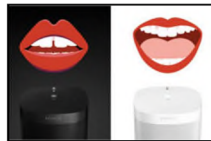
²“Apple introduces Siri for third-party devices”, Chris Welch, The Verge, June 7, 2021. Available at: <https://www.theverge.com/2021/6/7/22523045/apple-wwdc-siri-third-party-devices-ecobee-watch-tvos-tv>

³buildwithmatter.com (last accessed June 2021).

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roadmaps, to proprietary business data, including sales forecasts, to waivers of essential contractual rights. This results in less entrepreneurship and reduces innovation.

The issue is dramatically compounded when these companies then decide to use what they've learned about your business to produce remarkably similar products and to use those products to compete with you. Dominant platforms are able to develop copycat products by analyzing sales metrics on their platforms and combining them with the rich data profiles of their customers. These copycat products are then sold at cost or lower, with no intent to reap a profit. They also can use remarkably similar trade dress and marketing campaigns.



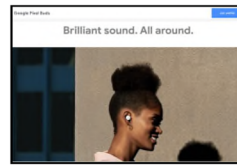
Sonos ad (2017)



Amazon ad (2018)



Sonos ad (2019)



Google ad (2019)

And while the dominant platforms make unnecessary demands on our data, they hoard their own much richer data sets in ways that can harm consumers and degrade competitive offerings. A good example arose in the important area of privacy, where we are tied to the mast as dominant platforms evolve their voice assistants. In 2019, Bloomberg News revealed that Amazon and Google were reviewing live voice utterances without customers knowing. Some of this review was conducted by outside consultants with even less accountability. The companies course-corrected and now inform their customers about these practices, but we've seen that such violations of trust impact the willingness of our own customers to add voice assistants in their home. Their behavior, whether responsible or not, swings purchasing decisions. Our business model is not founded on monetizing data, meaning that we take privacy seriously. We give our customers control over their privacy, and we don't sell their data to third parties. Meanwhile, when we tried to get access to anonymous error rate data that would allow us to improve the way our speakers respond to customer commands, we were told such data could

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not be shared for privacy reasons. Using privacy as a pretext for anticompetitive behavior ensures that voice assistants always work best and are “snappier” on devices built and marketed by the dominant platforms.

Why Congress must modernize antitrust law

We have been heartened as state and federal antitrust agencies have begun to investigate and, in some cases, bring enforcement actions against the more egregious anticompetitive practices, including, in our case, Google’s ban on concurrency. But the limited nature of the ongoing enforcement actions is not enough to protect consumers and promote the competitive process.

For that reason, we very much appreciate that Senator Klobuchar has introduced legislation to bolster antitrust enforcement. It is vitally important to recognize that a wide range of conduct that will suppress innovation and competition in the smart home space falls outside existing law. The world has changed a lot since the introduction of the Sherman Act of 1890, and we need reforms to address the new and unique challenges we face today in the digital age. The conduct addressed by the investigations and lawsuits brought by the Department of Justice, Federal Trade Commission, and State Attorneys General address just the tip of the iceberg when it comes to conduct that distorts competition in the smart home. We need legislation that promotes nondiscrimination by addressing restrictions on interoperability, predatory pricing and cross-subsidization, and misuse of data. We believe that Congress should be deeply skeptical of voluntary pledges by companies to forego such conduct, including insufficient commitments to interoperability, as we detailed earlier.

We urge Congress to act soon. Entrepreneurship is at risk, and venture capitalists are loath to invest in startups that drift too close to the “kill zone” by dominant platforms, while at the same time pumping money into firms that have a chance of being acquired by these platforms. The gatekeepers already control important sectors of the economy, and we are in grave danger of them extending their existing monopolies.

There are many other companies that have suffered from anticompetitive conduct by these platforms. But many are too afraid of retaliation for speaking up. We hope that in raising our voice, we will call attention to the need to support innovation in America.

Thank you for your consideration.



Statement by Ryan McCrate
Vice President & Associate General Counsel, Alexa Legal
before the United States Senate
Committee on the Judiciary
Subcommittee on Competition Policy, Antitrust, and Consumer Rights
June 15, 2021

Thank you, Chairwoman Klobuchar, Ranking Member Lee, and members of the Subcommittee. I am Ryan McCrate, Vice President and Associate General Counsel for Alexa at Amazon.

I joined Amazon in 2007, the same year we launched the Kindle eReader. Since then, I have supported a number of customer offerings including Amazon Video, Music, and Games Studios. In 2016, I took over as the lead lawyer for our newest product, Amazon's Echo and Alexa voice service. Our corporate philosophy is firmly rooted in working backwards from what customers want, and continuously innovating to improve that experience. Fortunately, for me, and the legal team I lead, a strong focus on the customer makes it easier to make good decisions. When you start with the customer and work backwards, the correct answer is often right in front of you. Technology is an important part of modern life, and it offers extraordinary benefits we are just beginning to realize.

I. Amazon's Alexa – Working backwards from the customer

At Amazon, we talk about inventing on behalf of our customers. Nine years ago, we set out with a goal: to bring voice assistants accessed on mobile devices to the home. The foundation of our vision was to build the *Star Trek* computer and create a service that made it possible to walk around your environment, and get information or anything else you needed just by asking.

The result was Amazon Echo and Alexa voice service. Alexa is a cloud-based voice service. Like your mobile device's voice assistant, Alexa lets customers play music; ask questions; and, get news, sports scores, weather, and more. With Alexa, multiple people could interact with their assistant from anywhere in the room. This approach required our teams to overcome substantial technical challenges. Unlike mobile devices, which required users to speak directly into their phones, Echo devices needed to work well in noisy environments and in different locations within homes that had different acoustic characteristics. Further, it needed to understand and work well for people with a diverse range of speech patterns, vocabulary, and accents. This invention opened up many new opportunities for expanding the smart home and customer experience.

Alexa is now available through a wide range of products, including Amazon's Echo family of devices, other Amazon products such as our Fire TV and Fire tablet devices, and devices developed by third-party manufacturers with Alexa Built-in and Works with Alexa. Alexa operates in a similar manner across the range of products on which it is available, although customers access Alexa differently based on the type of Alexa-enabled product they use.

Privacy and security were, and remain, foundational to Alexa's success. From early-stage development, we built privacy and security deeply into the hardware and service by design, and with Alexa and Amazon's Alexa-enabled products, we strive to put the control with our customers.

On our Echo family of devices, customers speak to Alexa by saying the "wake word" (Alexa, Amazon, Echo, or Computer) or, on some devices, by pressing the action button on the top of the device. The wake word is a critical element of the service. It was carefully selected to ensure the service would correctly understand when to "wake up" and start recording a request in order to respond. Alexa, a three-syllable word, is derived from the Library of Alexandria; and Computer, is of course, the AI in *Star Trek*.

Echo devices use "on-device keyword spotting" technology, which is designed to only detect the wake word. The technology analyzes acoustic patterns to detect when the wake word has been spoken using a short, on-device buffer that is continuously overwritten. This on-device buffer exists only in temporary memory (RAM); no audio is ever recorded to any on-device storage. The device does not stream audio to the cloud unless the wake word is detected. The user experience also provides customers with a clear indication of when audio is being streamed. When the wake word is detected, a visual indicator appears on the device to clearly indicate to the customer that it is streaming audio to the Amazon cloud (e.g., a blue light ring on the Echo device or a blue bar on the Echo Show's screen). We also offer a setting where customers can choose to hear an audible tone when their Echo device begins and ends streaming audio to the cloud.

Next, the audio is streamed to the Amazon cloud, where our systems for "automatic speech recognition" (converting audio to text) and "natural language understanding" (interpreting the meaning of text) then determine the meaning of the customer's request so that Alexa can respond appropriately. Amazon encrypts all communication between Echo devices and Amazon's servers, and stores all customer data securely on our servers.

We also give customers control of their voice recordings that are streamed to the cloud. Customers can review, listen to, and delete their voice recordings using the Voice History feature available in the Alexa app and on the Alexa Privacy Settings dashboard, located at www.amazon.com/alexaprivacysettings. They can also delete their voice recordings by voice by saying, "Alexa, delete everything I said today" or "Alexa, delete what I just said." Customers can also choose to not save any voice recordings at all.

Echo devices come with a microphone off button that also enables customers to manually control when their device's microphones are on. When the button is pressed to turn the microphones off, the microphones are electrically disconnected and a dedicated red LED light is illuminated to indicate the microphones are off. As an additional safeguard, we designed the circuitry of Echo devices so that power can only be provided either to this dedicated red LED or to the device microphones, but not to both at the same time. Our multimodal devices (i.e., devices with a screen) also come with a camera shutter as an added layer of customer control and privacy.

II. Developers and device makers – Core to Alexa’s evolution and customer choice

From the beginning, we knew that developers and other device makers were going to be the key to making voice assistants useful for customers, and to Alexa’s success. After Echo’s launch, we immediately turned our attention to opening up Alexa and the smart home to all inventors and developers. Prior to the introduction of Echo and Alexa, controlling connected devices was either limited to a manufacturer’s mobile app or to hubs like Apple Home Kit and Samsung Smart Things. We were the first to announce voice assistant integration into a third-party device, and we developed, without exclusion or licensing, a number of technologies that are now integrated into connected devices. In addition, we democratized access to the voice assistant with the Alexa Skills Kit. In fact, Google, and now Apple, have since embraced this approach.

We continued the journey to a smarter and more helpful home by making sure that Alexa could work with connected devices. We started with the obvious things, like connected lights and thermostats, but quickly added things like appliances—even lawn mowers—and Christmas trees. We’ve seen lots of innovation here: Alexa now works with over 140,000 compatible products from 10,000 brands. Customers use Alexa with their smart devices to simplify their morning routines, take chores off their to-do lists, and keep their homes safe. We love seeing this, but we’ve also always believed that having a smarter and more helpful home is about more than just having lots of connected devices—it’s about the experiences those products come together to create.

Developers and device makers have been core to Alexa’s evolution, and they will be critical to the future of our entire family of devices and services. Unlike an operating system, smart home devices can simultaneously support multiple voice assistants, and connect multiple services, devices, and sensors. Today, customers control their smart home devices through multiple services, interfaces, and commonly, the manufacturer’s mobile app. This is precisely why we do not ask Alexa voice service partners and device partners to be exclusive to Alexa, and why we do not collect licensing royalties for our patents that improve the smart speaker device experience.

We work relentlessly to improve the service so that our partners and developers can build products and capabilities for customers at a rapid pace. Today, there are hundreds of Alexa Built-in devices, including not only speakers, sound bars (e.g., Bose, Polk), and smart displays (e.g., Facebook, Lenovo), but also TVs (e.g., Sony, Samsung), PCs, hearables, wearables, appliances, and more.

Our Alexa “skills” program allows third-party developers to offer the equivalent of apps for Alexa that provide customers additional features and capabilities. We have over 130,000 skills, from well-known brands like *Jeopardy!* and OpenTable, as well as small developers like MyPetDoc and Big Sky. Some of the most popular categories of skills include smart home (e.g., Philips Hue, ADT), music (e.g., Spotify), sleep aids (e.g., Sleep Sounds and Headspace), and food & drink (e.g., Domino’s).

Alexa helps to generate billions of dollars for the developer and device maker community. Partners are successful with Alexa because they see more revenue and customer engagement, and an increase in brand affinity from integrating voice into their products and services. We also make our developer tool, the Alexa Skills Kit, free to use, and provide reference designs for hardware that make incorporating voice into devices extremely easy. This has unlocked new opportunities to both hardware makers and services providers to make their products smarter.

In addition to Alexa Built-in and Works With Alexa, we recently announced Alexa Custom Assistant. Alexa Custom Assistant is a new solution that lets companies create intelligent assistants that are built on Alexa technology, but with their own wake word. The Alexa Custom Assistant can be used to build intelligent assistants into an even broader array of devices, including automobiles and consumer electronics. It provides companies a comprehensive, managed voice solution that reduces the cost and complexity of their having to build their own intelligent assistant from the ground up.

For other enterprises that do not want to build on our Alexa voice service technology, a number of AI technology services are provided by products from Nuance, Microsoft's Azure, and IBM's Watson. At Amazon Web Services, we enable developers and businesses with no prior machine learning expertise to easily build sophisticated, scalable, ML-powered applications like Amazon Lex and Amazon Polly. Lex is a service for building conversation interfaces into any application using voice and text. Polly turns text into lifelike speech for all Amazon Lex languages.

We recognize that innovation does not just come from us. There are many smart people in the world who can innovate if given the right tools. We continue to believe in the promise of the Alexa virtuous cycle, where external developers and partners create a diverse and high-quality selection of skills, and these experiences fuel consumer engagement and choice. Because we've simplified the interfaces, standardized the technological components, and opened up the service to developers, there are now many home products by inventors large and small.

III. Voice Interoperability Initiative – Choice and flexibility for manufacturers and customers

We also fundamentally believe that customers should have the option to select the devices and experiences that best meet their needs, including the choice and flexibility to interact simultaneously with multiple voice agents on a single device.

Over a year ago, we announced the Voice Interoperability Initiative (VII). VII is a program to ensure voice-enabled products provide customers with the choice and flexibility to interact simultaneously with multiple voice agents on a single device. People use multiple voice assistants, and different voice services will have unique proficiencies and utilities. Voice-enabled products should be designed to support multiple, simultaneous wake words, so customers can easily interact with the voice assistant of their choice by saying the corresponding wake word.

We also don't expect companies to only use our services or our software. We believe partners and customers should be able to pick the solutions that work best for them. VII's membership now includes over 80 blue chip brands and small innovators alike, including consumer electronics, automotive manufacturers, telecommunications operators, hardware solutions providers, and systems integrators. In partnership with VII's membership, we have developed a Multi-Agent Design Guide, and work is underway on a developer toolkit to help companies prototype multi-agent products.

We believe interoperability is important, and that customers that purchase smart home devices should have a choice over the many ways they can access and use the device. This is why we've supported initiatives like the Matter/Connectivity Standards Alliance (formally the Zigbee Alliance) to drive more adoption of open protocols for smart home communications. The Alliance works to create and evolve universal open standards for wireless device-to-device communication for IoT to ensure interoperability for all consumer devices to work seamlessly together. Ultimately, success and trust is earned only when customers have the choice and flexibility to bring all of their devices and services into a seamless interaction.

IV. Smart Home – A helpful home that works harder for customers

In order to understand where we are headed, we have to first examine how we got here. The home has evolved substantially over the years, and we increasingly see customer interactions that demonstrate we are actually creating a more helpful home. When electricity was first installed in homes, that was probably considered “smart”—and now it is just standard. Similarly, we’re helping make the home truly smart with technology.

Anyone who has walked the floor of the annual International Consumer Electronics Show since the early 2010s is familiar with the infinite devices, appliances, gadgets, and now cars, equipped with sensors, Wi-Fi capability, robotics, or computing power that are being brought into the home. The smart home has been on an accelerated invention trajectory for well over a decade.

In the last 10 years, the technology has evolved considerably and, today, the smart home space is thriving. Equally important, it is intensely competitive. We are seeing fast follows to voice interface in robotics, ambient computing, and predictive machine learning tools. Customers will always use multiple interfaces depending on the context of their needs—browsers, apps, mobile phones, voice, robotics, and other sensors.

Voice assistance is still a nascent user interface (UI). It is a natural progression from typing, to swiping, to speaking; and, it supplements, rather than replaces, prior UIs. Depending on the application, the location, and utility, customers will access the UI most suited to their need in the moment; such as, typing “weather” into a browser while in the office, opening a weather app on a mobile device while on the go, or asking a voice-enabled device a question while cooking in the kitchen.

Furthermore, the vast majority of voice interactions today still occur on a user’s mobile device, as eMarketer estimates that nearly 90% of voice assistant users use a smartphone voice assistant at least once a month. We invented enabling speakers with a voice assistant; however, we were not the first or even second in voice. In fact, today we are still well behind Google Assistant and Apple’s Siri in customer interactions, despite the growing adoption of Alexa-enabled smart home devices. Apple just announced that 600 million devices monthly are using Siri. When we first dreamed up Alexa, our peers had much more relevant data for the purposes of building a voice assistant. For example, when Apple launched Siri in 2010, it had ample amounts of voice search data given its large base of iPhone users. And, when Google launched a voice directory assistance program in 2008 (“GOOG-411”), in order to evolve and refine their voice technology, they were able to build on a huge volume of voice search queries. In contrast, we had no pre-existing voice data when we set out to build Alexa. The story of Alexa’s development illustrates that success and failure are not pre-ordained. Innovation, intuition, willingness to take risks, and working backwards from the customer determine success in cutting-edge products and services. Sometimes the risk pays off for us, as with Alexa, and sometimes we fail, as happened with the Fire Phone.

Moreover, as we are seeing by the large and growing number of competitors big and small, there is room for many winners, especially given the different specific competencies of various products. We see great promise for a future where people use multiple voice services, and we're committed to making that experience as seamless as possible for our customers. Companies like Spotify have made significant investments in their own voice technologies. The number of voice assistant options is growing and include Google Assistant, Siri, AliGenie, Duer, Bixby, Sherpa, and Lyra, among others. Investments are also growing in many service sectors. Most notably, banking and healthcare have begun integrating bespoke voice technologies in consumer banking features, the pharmaceutical research lab, the hospital, and electronic record systems.

V. Conclusion

The modern home is smarter than it has ever been. Equally important, this space is intensely competitive. The Alexa team and I are motivated by this—we are looking at how we can continue inventing for customers and identifying solutions for challenges we never thought we'd face.

Alexa has proven to be incredibly helpful to our customers, and we've been humbled by how customers are relying on our devices to do everything from staying connected with friends and family through videos and live view check-ins, to asking Alexa to set a timer so baking brownies don't burn, and to dim the lights for movie time.

When we first began working on Alexa, we also didn't fully comprehend the profound impact Alexa would have on people's lives. Customers experiencing arthritis can now easily text grandchildren. A person who is blind or with low vision can hold an object up to Echo Show devices, and Alexa will tell them what it is. Customers with mobility impairments have shared stories about how they use Alexa's voice features with smart home devices to manage their entire household. Young customers who may be dyslexic now have an ability to interact with a computer through the voice interface.

These are just a few examples of what voice services like Alexa can do. It's technology that makes the home more helpful for our customers, and we continue to experiment and learn how customers put this new interface to work.

Thank you for this opportunity to share our vision for a better home experience. I am happy to take your questions.

**Testimony of Jonathan L. Zittrain
George Bemis Professor of International Law
Professor of Computer Science
Co-founder, Berkman Klein Center for Internet & Society
Harvard University**

before the

Subcommittee on Competition Policy, Antitrust, and Consumer Rights
Committee on the Judiciary
United State Senate

June 15th, 2021

Chairwoman Klobuchar, Ranking Member Lee, and members of the subcommittee:

The Internet moment

In the late 1980s I was a sysop -- a "system operator," or online forum manager -- on CompuServe, one of the proprietary precursors to the mainstream Internet. CompuServe subscribers paid by the minute for news, weather, and to chat with one another; the company provided both the network and the orchestration of that content. It was a time of seemingly vibrant competition—an American wanting to get online in that era could choose not only CompuServe but also from among such competitors as The Source, Prodigy, America Online, MCI Mail, Delphi, and GENie.

These services did not interoperate with one another. For example, while each had an implementation of electronic mail, you could only communicate with fellow subscribers to the same service. Which, if you only wanted to pay for one service, could make switching very onerous: to do so would entail leaving behind your existing communities, service offerings, and habits. The nominal availability of alternatives masked the sense of capture that an early adopter, or really any adopter, might experience after having invested in one service or another.

Moreover, the kinds of innovation that competition among services like these produced was at the margins. One might be a little cheaper than another or offer some exclusive content through an apt business deal with, say, a news service or a particular celebrity,

Testimony of Jonathan Zittrain Before the United States Senate

but all assumed that they would have to offer both network connectivity and their own content, under a transactional pay-per-use business model. In 1991, thirty years ago, the industry's big question was which one of those competing services would ultimately beat or buy out the others, winner take all.

Happily, it turned out, this industry was asking entirely the wrong question. All of these services were steamrolled by the arrival and growth of the mainstream Internet, a technology designed with a completely different architecture, ethos, and economic model.

The Internet's framers, in an unusual divergence from the spirit of both the corporate structures of the 1980s that the Internet eclipsed and the startup culture of the late 1990s and 2000s that the Internet spawned, implicitly foreswore making any money from their invention. They also did not anticipate raising and spending millions of dollars to build a centralized commercial network, much less to provide for the placement of content upon it.

The result was a network design in which *protocols* – elegantly and precisely specified ways for disparate existing networks to communicate – were developed and made available for anyone to implement, ranging from the makers of network hardware to developers of any piece of software that wished to speak “network” (or “email”) with any other piece of software. Content would be provided by the network's users to one another rather than sourced from the network itself, from a hobbyist running their own blog server to a “voice-over-Internet-protocol” audio call mimicking legacy telephony to HBO streaming its latest hits.

This Internet, and the World Wide Web built upon it in a similar spirit – a killer app whose inventor exclaimed, “[This is for everyone](#)” – had and to this day have no CEO, no main menu, no “center” at all. These very absences the “[unowned](#)” Internet, and the content proliferating upon it from so many sources, to so quickly render the stove-piped proprietary information services thin and tinny by comparison, hopelessly behind in both service offerings and content. Those walled gardens soon retreated to become either small content outposts on the Internet themselves – abandoning charging for “connect time” – or to become simply commoditized Internet network on-ramp providers for the balance of the dial-up era. The latter strategy worked until the demands of broadband provision, something only possible through companies that had provided actual wires or specialized wireless links to subscribers, made it untenable. The entire pre-Internet sector of intense private competition had lost to a collective hallucination, a public good controlled by no one entity, including the government. That is, to an open protocol that

had garnered enough support to gain a momentum all its own, one still going more than thirty years on.

When the Internet became ubiquitous by the early 2000s -- with truly nothing meaningfully competing against Internet Protocol -- it eliminated the superficial competition among the proprietary information services and replaced it with a much more meaningful competition among anyone prepared to offer up a Web site or an Internet-aware app.

Whether you had a PC or a Mac or something else entirely, and whether you variously connected from home, a public library, or an office, sometimes wired, sometimes wireless, the full range of the Internet's offerings were on tap. A single flexible, freely-available shared protocol, open to third party contribution with little or no gatekeeping, promoted competition through anyone's [building upon its generative base](#). Once started, its gravitation was irresistible. It became a monopoly with no monopolist behind it, and thus no means of cornering or exploiting it. It was a commons.

This realization of the Internet was not inevitable. As its predecessors make clear, it certainly did not have to be designed the way it was. For the Internet to become ubiquitous required a special alchemy comprising the moment it went mainstream, the unusual ethos and capacity of its designers, the pent-up supply of independent software and content developers ready to provide new Web sites, and the angel and venture communities anxious to fund them. There was also comparatively tiny but absolutely vital funding from the National Science Foundation to support some of the basic research and initial network linkages to prove out the eccentric theory of the Internet's layered design -- its insight to separate network from content, and to "packetize" information flows so that they could share a common network pipe even if from disparate sources and destinations, rather than needing dedicated network lines at the ready for exclusive dedication to every given single connection between two parties.

Whatever the many problems befalling the Internet and those of us who use it today -- and there are [many](#) -- we are, on balance, in an incalculably better and freer place than we were thirty years ago, and than we likely would be today had the early metered models of network-with-content continued to force us to choose one ecosystem over another, or, through consolidation, experience collectively a single (no doubt government-regulated) monopoly provider of information who would approve each new digital service or content offering.

The [yearslong](#) and, in a narrow sense, [fruitless](#) battles over the “[set top box](#)” -- back in the day when it was assumed that monopoly or duopoly cable television providers would be the only way to serve broadband services into Americans’ homes, and those providers would be the only sources for those junction boxes -- demonstrate [how fraught](#) the effort can be to enable even a fraction of the Internet’s capacity for permissionless innovation. (Google and Amazon were, understandably, [fiercely interested in promoting competition](#) in that realm.) Without the Internet, the product of even intense competition among the proprietary network providers -- each competing rationally -- would have fallen short. And that’s because the benefits of interoperability can help everyone, even as no one party is in a position to want to invest in that interoperability until it has magically already happened.

The Internet of Things moment

The Internet’s moment offers a number of important lessons for the topic of today’s hearing on protecting competition and innovation in home technologies. In ways that at least rhyme if not repeat, today’s development of the Internet of Things -- that is, Internet-aware devices that react to the bits they receive and send out bits of their own -- is at a fork like that of the proprietary information services in the 1980s. There is a layer of genuine if superficial competition among competing ecosystems to connect people with the things whose features they’d like to control over the Internet -- usually through their mobile phones. Amazon, Google, and Apple are among those offering smart home systems to control such things as light bulbs, thermostats, and speakers. And some makers of devices, whether particular brands of light bulbs, dishwashers, or home security systems, offer single-purpose mobile phone apps or Web sites through which to control those things over the Internet.

I say superficial because this kind of competition offers the worst of both worlds. It’s fragmented enough to be frustrating for consumers wanting to furnish their houses, requiring them to accrue a motley assortment of stovepiped apps for each new device, or to be eagle-eyed about what’s compatible with what when a device tries to use a broader control platform and interface offered by a bigger company like Amazon, Google, or Apple. And once a consumer has made an investment in one of those systems, each new physical device purchased for use with that system can serve to lock the consumer into that standard, even if a competing ecosystem turns out to be more desirable if there were a clean slate. That undermines a critical form of consumer self-defense, which is the basis for fulsome market competition. If one of the big providers stops patching its control platform or producing good hardware, there’s no

easy opportunity to decamp for another ecosystem without putting a lot of stuff up for auction on eBay or making a significant contribution to a landfill -- some of which might have to be literally pried out of the walls before decommissioning. The closest pre-Internet-of-things analogy might be that of Microsoft ending security patches for the version of Windows XP that many [bank ATMs run](#) -- with few ready alternatives for the banks.

Because control for smart devices is typically built upon a mobile phone's triggering, one's initial upstream choice of smartphone could end up with long-term lock-in. Just as many of us idiosyncratically possess phone numbers with area codes frozen from wherever we were in 2006, a decision about what mobile platform on which to start a teenager -- perhaps simply mirroring that of their parents -- can have yearslong implications. For example, buying the iPhone brings along with it Siri, Apple's virtual assistant. Siri is the way that a consumer might expect to control their smart devices. In turn, Apple decides what devices Siri will work with. If Apple were an upstart, it might importune as many smart device makers as possible to build towards compatibility with Siri. Because it's not an upstart, the power flows in the opposite direction: anyone building a smart device will likely want to make sure that it can work with commands issued by the phone owner to Siri. That can put a smart device maker in a vise, as one operating system maker may make demands upon it in order to include it in its ecosystem -- demands that influence what arrangements the device maker can enjoy with other operating system makers. To be sure, someone browsing the smart electronics aisles at Best Buy or Staples will find [plenty of products](#) that can be controlled by different IoT control platforms. For instance, if you want to buy a Wyze [smart plug](#), or a Phillips Hue [smart light bulb](#), you'll find the products are compatible with both Amazon Alexa and Google Nest devices. Connecting similar devices with the Apple HomeKit can be a bit trickier, though there are "[hacky workarounds](#)," such as [Homebridge](#) that people with extra time on their hands can use to connect them up.

But the give-and-take between control platform makers and device makers rarely takes place in public view, and little precludes platform makers from shifting the technical terms of compatibility. This might bear on developers' abilities to make their technologies available to consumers at all, given what we know of the inflexibility of the terms sometimes set by the large players. For example, the European Commission's recent [report](#) from its inquiry into the Internet of Things describes how the requirements imposed by the largest players for independent developers to gain access to their ecosystems "may even require changes to products during the development or production process" and that by imposing these requirements, they may "be able to limit

the functionalities of third-party smart devices and consumer IoT services, compared to their own.”

And the operating system makers themselves can end up on all sides of these deals. I doubt it would surprise anyone if Apple announced next week that it was making smart light bulbs, the way that Amazon makes Echo speakers -- which are not only capable of playing news and music, but receiving commands to feed to Amazon’s assistant, Alexa. Alexa can help with purchases (most seamlessly, naturally, if they’re placed at Amazon.com) and with controlling devices that are Alexa-compatible. The worst-case plausible scenario in the jostling among device makers and competing OS manufacturers is something like this: thanks to the iPhone your parents got for you as a teenager, your photos and calendar are in Apple iCloud; your purchased apps are iPhone apps; and your devices are arranged around compatibility with Siri. When you’re shopping for your first apartment or home in your thirties you may need to know if its appliances indicate that it’s a Siri residence versus an Alexa one. This makes about as much sense as if the color your childhood bedroom was painted had some bearing on what car you could drive and apartment you’d want to rent ten years later. This kind of lock-in [can sometimes be quite willful](#), such as in the realm of instant messaging apps, which [remain all over the map](#) on interoperability with one another. And at least one major app, Apple’s iMessage, even resists cross-platform compatibility, working only on Apple operating systems.

It’s possible that these competing Internet of Things ecosystems will converge to a single one, through acquisitions and runaway [network effects](#) by a single winning competitor. After all, the more users a system accrues, the more device developers will seek to be compatible with that system, in turn drawing more users. It would be the equivalent of AOL winning the proprietary online services wars, with no dark horse Internet to displace it. Or, say, Uber beating out Lyft and lesser-known worker cooperatives by constraining how readily consumers or drivers would want to switch between those apps, respectively. Apple, theoretically, could even take sides in that competition by selecting a single rideshare service as its business partner to fulfill any requests Siri gets to “find me a ride home.”

We saw exactly that maneuver in play when Apple struck a deal with Google to cement Google Search as the [default search engine on Safari, now subject to an antitrust suit](#) by the Department of Justice. (A [similar deal](#) has provided enormous financial support to Mozilla in its shepherding of the Firefox browser.) The market behemoths aren’t shy about striking deals with one another if it means everyone gets to consolidate market shares, as in this instance where a dominant player in one market (Apple, for mobile)

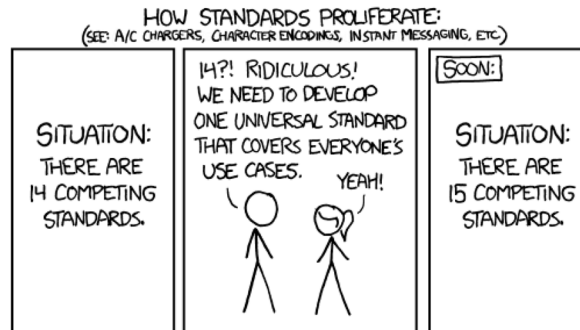
uses that position to extract rents for preserving the position of the dominant player in another market (Google, for search). Each big player vying in the Internet of Things domain – including some of those testifying today – would be within its rights to think it owed its shareholders an attempt at these kinds of winner-take-all plays.

Or, each player might also see the value of interoperability, the way that CompuServe and AOL might have arranged to exchange emails with one another as a way of increasing their appeal to their respective subscribers. And we see some efforts, which we can credit as genuine if not destined for certain success, in today's home technologies. For example, the [Connectivity Standards Alliance](#) has subsumed several previous efforts to achieve interoperability, and now leads the development of [Matter](#) (confusingly, formerly known as CHIP), a standard backed by Amazon, Google, Apple, and numerous other industry participants which, if widely adopted and not captured by a handful of interested parties, could allow independently developed devices to interact with the major mobile operating systems and, in some cases, directly with one another. Another example is [Iotivity](#), underwritten by various companies in the smart device space such as LG and Samsung. These consortia bear some resemblance to the kinds of grassroots processes, including both individual and corporate contributions, that fused Internet Protocol. But the most active consortia in the home technology space more closely resemble those of, say, the [entertainment industry](#) in the governing roles of the corporate sponsors. These elements were distinctly absent in the guiding organization for Internet Protocol – the [Internet Engineering Task Force](#), “open to any interested individual,” with a “[volunteer core](#).”

These efforts might work. They also might not; there are reasons why a play for interoperability might, at a crucial moment, see a break by a major player for the exit if they think they can end up taking everything. (Worries about security could provide both a pretext and a genuine reason for such a closing-up.) Indeed, even as Matter perhaps is gaining momentum in the industry, Amazon has [been involved](#) in it while also freelancing its own Internet of Things-related protocols, such as [Sidewalk](#), which provides a form of mesh networking among compatible devices. Moreover, these initiatives are about ways for devices to interact with control systems or one another, which on its own terms does not speak to the question of dominance among the user-facing front-ends like Alexa, Siri, and Google Assistant.

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And, without trusted industry-wide buy in, any new unifying standard risks becoming just yet another instrument in a cacophony. As Randall Munroe [succinctly puts it](#):



There's another area in which potentially salutary competition could be fostered, a counterpart to the "demand side" of user interfaces to control home technologies through such things as mobile platforms' digital assistants. We should consider for a moment the "supply side" of the home technologies themselves.

Crack open most smart devices and you'll find them running some flavor of a GNU/Linux operating system -- an OS that itself emerged in a [decentralized, unowned way](#). (You can see why, if a device would benefit from having an operating system at all, its maker might choose one that doesn't exact per-unit licensing fees.) It might turn out that independent software developers, whether for whimsy or profit, could build new functionalities into the devices that their makers did not foresee or have the time or financing to build themselves. After all, the iPhone itself, like the iPod before it, was completely closed at the time of its introduction: wholly programmed by Apple. Only later did Apple unveil a software development kit and corresponding App Store to allow users to choose from among what would become nearly [two million Apple-vetted](#) third-party apps.

There could be a highly generative path by which makers of home technologies could choose to allow -- at a user's own risk -- choice in what kind of software will run on a device's operating system, which could also make easier the continued functioning of that device if the manufacturer vanishes. For example, one company, [Moddable](#), is developing an openly-licensed toolkit to make it comparatively easy for would-be

independent software developers to make substitute software for potentially long-lasting hardware.

Remedies

So what should we do? It's true that in this area, as in so many that concern generative technologies and dynamic markets, the line between "too early to tell" and "too late to do anything about it" is vanishingly thin. To intervene too early countenances all the well-known worries about government policymakers substituting their own central planning for the efficiencies and creativities of a vibrant marketplace. But late interventions can be at least as undesirable, upsetting settled (if at a poor equilibrium) markets and technologies in ways that governments rarely dare to do. We collectively lucked out when the soft mud that was Internet Protocol became concrete before all existing stakeholders had a chance to argue about what a digital network should look like -- because if there were such a chance, the incommensurable demands that would be placed upon it would result either in paralysis or a network so locked down that very little that was truly new could be built upon it.

The marketplace for smart devices is, of course, broadly known, and has attracted enough commercial stakeholders to take the original playbook for successful Internetworking -- developed quietly among academically-minded network engineers for the 1970s and 1980s before unexpectedly crashing onto the mainstream scene in the 1990s -- off the table. But there's still plenty that policymakers can and should do.

First, Congress needs to update and reform the law of antitrust. It should articulate a coherent vision around which sorts of potential ultimate landscapes for an Internet of Things ecosystem would represent comparatively stagnant failures and which ones would be vibrant. This may be *easier* than it sounds -- I suspect everyone testifying today, for example, will offer no objection to the idea of an environment in which consumers can have a choice of operating systems as well as interfaces with which to interact with smart devices, and similarly, in which developers of devices aren't yoked to a monopolized bottleneck that can make or break their business. How much they mean it is no doubt another story -- but here any hypocrisy would be a virtue, as it might lend itself to a surprising consensus about the role of competition within common standards, and a stated appreciation for the kind of environment the Internet itself provided thirty years ago and still largely does today.

A vision supporting that kind of environment can then find itself realized in clearer legislative definitions of, for example, what counts as a “market” here in antitrust terms. Unlike markets for, say, milk or pig iron, the products and services of information technology are so consummately shaped by the companies that produce them that they can all too readily declare what’s subject to competition and what is simply part of their product offering. For example, Apple might someday say that Siri is inextricably linked with iOS, and that iOS *means* Siri. Today, a particularly determined iPhone user can install the Google Assistant on their phone and then create an odd bucket brigade between Siri and that interloper. I doubt you’ve seen anyone saying, “Hey Siri: Hey Google, what’s the weather,” to have Siri ask Google to listen to your question about the weather, but it’s -- by Apple’s sufferance -- [possible for the moment](#). But you can’t eliminate Siri from the chain. And Apple might say that it would unduly degrade the iPhone experience to allow Siri to be wholly supplanted by any other assistant, even at the user’s request.

This bears a striking similarity to the Microsoft antitrust case at the turn of the century, where Microsoft stridently argued that its own browser, Internet Explorer, was so central to its users’ experience that those placing Microsoft Windows on new PCs were not to be permitted to substitute, say, Netscape for Internet Explorer, if they wanted to be able to offer their PC purchasers Windows at all.

Microsoft went so far as to try to “bolt” Internet Explorer into Windows, such that when the company was ordered by the judge hearing the case to allow PC makers to substitute other browsers, Microsoft told PC makers that they could only implement this option if they did so in a way that typically [prevented the system from booting at all](#).

If I can buy an iPhone but choose what assistant I can directly invoke with a few words, that’s a meaningful form of competition at the “assistant” layer. And that layer is important for the purposes of today’s hearing, because it’s the assistants that in turn translate people’s requests and desires into commands to a smart device like a lamp or a door lock – if the smart device maker is amenable and allowed by the maker of the assistant to connect. In fact, it is at the assistant layer that today’s IoT landscape sees perhaps the most striking similarities to Microsoft’s antitrust (mis)adventures decades ago, with the European Commission’s inquiry into the state of consumer IoT [reporting](#) that voice assistant providers “would only licence their voice assistants together with other types of software, technology or applications and not on a stand-alone basis.”

So, the law of competition can and should be shaped to recognize when what is offered as a single bundle of operating system and feature is best construed as an undesirable

vertical integration of one platform with another platform (even if conveniently labeled as a single platform). Once recognized, the law can then incentivize the provision of competition at each concentric layer above that of the operating system, in particular favoring the provision of common interfaces for any developer to be able to use for its new devices.

My choice of phone shouldn't roll into a necessary choice of assistant. And any given assistant should be able to be commanded to interact with any number of devices willing to adhere to a common protocol for giving it simple commands. That is, not only should I be able to swap Siri for Alexa for the Google Assistant on any phone, I should be able to ask any of those assistants to connect with any device whose makers have gone to the trouble to be able to parse common protocols to control smart devices. Gatekeeping of such connections -- whether in the name of quality or security -- should earn the kind of scrutiny that exclusive app stores are earning today, where the competition permitted by the operating system maker can be strategic and selective as much as it can be fulsome. To be sure, this kind of interoperability brings its own challenges. Steve Jobs's famous refrain of "[It just works!](#)" when introducing one groundbreaking product after another at developer conferences -- products innovative in their seamless user interfaces more than in raw functionality -- is made easier when [a company has control](#) over [most if not all aspects of its platforms](#). But the law can set out standards here that are coherent and interpretable, and in turn offer companies, not least Apple, a level playing field and calculable rules on which to develop these systems.

Second, it's entirely fitting for a government to actively subsidize public goods like a common defense, a highway system, and, throughout the Internet's evolution, the public interest development of standards and protocols to interlink otherwise-disparate systems. These subsidies for the development of Internet protocols, often expressed as grants to individual networking researchers at universities by such organizations as the National Science Foundation, were absolutely instrumental in the coalescence of Internet standards and the leasing of wholesale commercial networks on which to test them. (They also inspired some legislators to [advertise their own foresight](#) in having facilitated such strategic funding.) Alongside other basic science research support, this was perhaps some of the best bang for the buck that the American taxpayer has received in the history of the country. Government support in the tens of millions over a course of decades resulted in a flourishing of a networked economy measured in trillions.

Further, government procurement standards could be devised to favor the acquisition of smart devices and operating systems for use by the government in its role as

technology consumer that subscribe to the open standards flowing from these efforts. (Just this approach is in use in the [recently-passed law](#) to promote more rigorous security standards for the Internet of Things.)

Third, Congress should consider what balance is appropriate to strike between vendors who might resist competition and consumers and third-party developers who might try to spark it anyway. For example, in a fascinating application of artificial intelligence, researchers are developing [RL-IoT](#), a system by which outside developers might discern how to communicate with otherwise non-interoperable IoT devices, potentially linking modern, smarter systems, to those which might fall behind the state of the art and fail to offer any documentation of how they behave. Or consider the other “supply side” interventions discussed earlier – those of third parties who, on behalf of consumers, seek to run entirely new code on existing device hardware. Perhaps under some circumstances the law should require disclosure of functionalities, or outright openness to the running of new code, as a way of reducing consumer lock-in. At the very least, there might be wise limits to place on the ways that proprietary vendors might invoke the law, including the law of copyright and paracopyright (such as the [anti-circumvention provisions](#) of the Digital Millennium Copyright Act), to foreclose such unwanted competition in the absence of a mandate to allow it. Many of these questions fall under what’s often debated as the “[freedom to tinker](#),” and the coming deluge of smart home technology will reignite that debate, not just for unusually inquisitive and bold ham radio types, but for consumers who, at the press of a button, could implement in their own devices what those pioneers might build.

We’re still early in this build-out, and what both can spark some beneficial market surprises and potentially result in undesirable anti-competitive cul-de-sacs is the fact that so many players in this space are sitting on massive stockpiles of cash and rivers of income – these could be used for research and development, and they can also be used to defend their preeminence, as with the Google-Apple deal currently under challenge.

Amazon and Google, here today, are not only their well-known consumer-facing brands. They are also holding companies so large and influential that they could become serious market players anywhere they choose to play. Next week’s headlines could hypothetically feature [Apple getting into the car business](#) – or Tesla [getting into](#) the smartphone business. Google is already [into both](#), and cars and phones join nearly every other physical object that boasts a battery or a power cord as an element of the Internet of Things. This dizzying game of musical chairs of companies and products would be all to the good if the makers of each had their functionality compatible with

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evolving common standards of communications with the others. It's a proposition as powerful as that behind why the Internet and Web are better than CompuServe, and yet there is, in 2021, no inevitability that it will be brought to life.

Finally, I'd be remiss if I did not point out other areas in which public policymaking would be helpful – indeed, might be desperately needed -- for the emerging Internet of Things, especially to the extent that making a product “smart” serves to transform it from singly-purchased product into ongoing service.

First, as a matter of both competition and security, devices that lose connectivity should be able to continue to function at some reasonable level without the internet, especially when they are substitutes for pre-Internet appliances, whether cars or coffee makers. That is, if they lose the ability to be smart, they should still be no less dumb than their analog counterparts. Devices should document what they can and can't do when voluntarily or involuntarily in “airplane mode,” removed from connectivity. This is a [matter of security](#) so that refrigerators, cars, and light bulbs can still work if the Internet goes down. It's also a matter of competition so that people can still choose to use these products even if they no longer wish to pay some monthly subscription demanded by the original vendor, or if the original vendor goes bankrupt or pivots to an upgraded or unrelated product line.

Second, producers of devices above a certain threshold of popularity and adoption should be required to escrow the devices' operating systems and code, as well as [post a bond](#) to be cashed should the producers intemperately abandon the products. The money and code can be used to charter a non-profit foundation to maintain basic functionality for the devices to an approximation of a normal product life, or perhaps even beyond. The Firefox browser [emerged](#) from the abandonment of Netscape many years ago, and the Mozilla community that has grown around it has not only continued to innovate new features but to keep other browser-makers on their toes as a result.

Third, and I say this as someone who historically has not broken the glass and pulled the fire alarm for every possible concern about digital privacy over the past thirty years, the Internet of Things stands to become a privacy apocalypse.

The devices composing home technologies have an array of sensors -- microphones and cameras are quite common -- and they are always powered up and Internet-connected, which also means they can garner an immediate sense of where they are physically located. This opens up entirely new avenues of government-mandated monitoring, and in the United States the ground rules for such

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surveillance are as yet poorly understood, since they were developed around *communications* technologies, that is, devices put into use only when one person is trying to communicate with others, such as telephones. They were also forged at a time when entrusting documents and other information to third parties was a comparatively rare and deliberate act -- making the law [commensurately less protective](#). Smart home technologies flip this baseline, standing to quietly stream all sorts of in-home activity to third parties, where it would be unduly too-readily obtainable through government process. Not to mention the prospect that these devices will be deployed in jurisdictions that do not embrace the rule of law.

I believe the opportunities for expansion of government surveillance are so great that in the medium to long term [they will vastly outweigh](#) whatever hurdles law enforcement has encountered with the rise of encrypted messaging apps and the often-invoked problem of "[going dark](#)." A Congress concerned with civil liberties should be laying down consistent, transparent, and appropriately restrictive rules of the road now, before habits of surveillance for home technologies are established and then deemed indispensable even as today they are barely in use.

At least as worrisome, if not moreso, is the fact that these devices can be in a position to communicate what they see and hear back to their vendors, or to anyone the vendors designate, in way that is completely unmonitored by both consumers and those concerned with their protection, whether non-profits like [Consumers Union](#) or government actors like the FTC or state attorneys general. It is past time for Congress to itself, or through blandishment or mandate to the FTC, create standards for data collection and transmission for home technologies, rather than simply carrying over the more lenient baselines from the Internet environment that [except for the most egregious practices](#) merely require a privacy policy to be elucidated -- whatever its contents -- and, through [state regulation](#) like that of California, compel some rapid-fire decision prompts to users about accepting cookies. This is especially important given the previously-discussed lock-in that hardware-based environments can produce. If my oven, or set of in-ceiling speakers, have updates to their privacy policies that I wish to reject, I may have no alternative short of junking those devices -- a very different situation from simply choosing to no longer use a Web site or app, where the more modest problem of data portability might be my biggest worry.

There's an antitrust lens to the privacy landscape as well, when, as the European Commission [report](#) describes, "certain consumer IoT players, in particular the leading voice assistant providers, can impose standard terms and conditions that limit data use by third parties, while reserving extensive data use possibilities for themselves."

Finally, there are acute problems around security. It's one thing for a vendor to directly betray its customers by surveilling them in unexpected ways; it's another for any number of third parties to be able to do it thanks to lax security by that vendor. And because we're talking about physical objects, surveillance isn't the only risk. Over five years ago, researchers were able to hack a Jeep from afar, "[taking over](#) dashboard functions, steering, transmission and brakes." Chrysler's resulting recall of over a million vehicles took the form of [sending USB drives](#) to affected customers, who were to fix the Jeeps by plugging the drives into their dashboards.

There should be subsidized "red teaming" of smart products, looking first for vulnerabilities and, more important, for the kinds of systemic issues that can arise in interconnected and interoperable systems. For example, one group of researchers found a bug in the Zigbee Light Link protocol (Zigbee has since been absorbed by the Connectivity Standards Alliance mentioned earlier) that, [in their words](#):

By plugging in a single infected lamp anywhere in the city, an attacker can create a chain reaction in which a worm can jump from any lamp to all its physical neighbors, and thus stealthily infect the whole city if the density of smart lamps is high enough.

If there come to be tens of millions of products from a single vendor running proprietary, opaque software, a single vulnerability within the resulting [monoculture](#) could be exploited broadly and simultaneously. (Worse than a single flawed Jeep being remotely run off the road is a million Jeeps being remotely run off the road.)

Of course, while the damage from having all one's eggs in one compromised basket could be catastrophic, there are also plenty of risks in a more variegated ecosystem, since the resulting mosaic of vendors will no doubt have different commitments to security. If there are to be competing providers of software on both the demand side (e.g., the digital assistants and control systems) and the supply side (the smart devices themselves), it will be that much more important to be able to audit how they work and to have some form of screening to assure a minimal level of security against both unintended vulnerabilities and outright scams. The state of the art for this for our legacy consumer and enterprise information technology is a messy, unsatisfying combination of whack-a-mole antivirus software and best efforts vetting in app stores by judges whose decisions are opaque, and who belong to companies who themselves are competitors in the space.

There's a dire need to version up these approaches, or supplant them entirely, with trusted mechanisms that can better isolate ongoing security decisions from the controlling platforms' business strategies. There could come to be an accepted role for traditional public safety regulators or quasi-regulators like the non-profit [Underwriters Laboratories](#), as there is for the review of minimal safety for food, children's toys, automobiles, and even [table lamps](#). Even without the complications of third-party competition in software, Internet-connected smart devices should simply be rated for safety and security.

I'm very grateful for your having chartered today's hearing, while we're still in the "too early to tell" stage for the shape of Internet-aware home technologies. I imagine the very act of asking some of the leading companies to weigh in today conveys a message that Congress is involved and watching, mindful of the forking paths that could lead us closer or further from an environment of meaningful competition and inclusivity that in turn sparks a new round of innovation and creativity -- while minding privacy and security.

These issues are deeply important even if they might seem, deceptively, not urgent, and I thank you for the opportunity to share my thoughts on this topic today.

Written Testimony of Wilson White
Senior Director, Government Affairs and Public Policy, Google LLC

Senate Judiciary Committee
Subcommittee on Competition Policy, Antitrust, and Consumer Rights
[“Protecting Competition and Innovation in Home Technologies”](#)
June 15, 2021

Chairwoman Klobuchar, Ranking Member Lee, and distinguished members of the Committee. Thank you for the opportunity to appear before you today.

My name is Wilson White. I am Senior Director of Government Affairs and Public Policy at Google, where I lead policy efforts for our connected devices and Android operating system. Bringing more helpful services to more people is what motivates me to come to work every day.

At Google, our goal is to [be helpful to people in moments that matter](#). It's in those moments that technology can truly improve people's lives. I think of a [Google Pixel user named Chris](#), who was a passenger in a car that was suddenly struck at high speed by a truck in a poorly marked three-way intersection. Stunned by the impact, with the smell of burning rubber in the air, Chris was panicked. Disoriented and unsure what to do, he felt his Pixel phone vibrating. The phone had detected that Chris had been in a car accident and it automatically prompted him to dial 911 so that Chris and his family could quickly get life-saving help when they needed it most. To us, this is what it means for connected devices to help in a moment that matters.

That a phone can tell when you might need emergency help shows just how far we've come, and it's just a preview of the innovations that lie ahead. Just thirty years ago, most Americans were fortunate if they had a computer at home, and even luckier if it could access the Internet. Today, most Americans have a supercomputer in their pocket. Access to the Internet on desktop computers paved the way for an innovation explosion on mobile phones. We're now witnessing the dawn of a new era in computing, beyond the mobile phone, where a growing number of devices in our lives will harness computing to help and support us.

At Google, we're proud to play a role in spurring innovation in this fast-moving, hyper-competitive, but nascent space. We've always believed that open platforms enable competition, which is the best way to put great services in the hands of users at the lowest cost.

It's in that spirit that we've pushed for openness across smart home devices. Back in 2019, we joined with others to [create](#) an independent working group to build an open connectivity standard that would allow devices to work together across a range of smart home

ecosystems. Open standards foster competition by leveling the playing field for smaller players and new entrants, simplifying product development, and increasing choice for consumers.

The working group--now called the [Connectivity Standards Alliance](#)--has come a long way. Last month it [announced Matter](#), an "interoperable, secure connectivity standard for the future of the smart home." We're [bringing](#) Matter to Android and a range of Nest products, making these products more open and customizable.

The future of connected devices has never looked more promising. In my testimony today, I will focus on three factors that shape Google's approach to this new and innovative space:

- 1) helping users choose which services to use and putting users in control of their data;
- 2) building open platforms that enable other companies to build successful products; and
- 3) intense competition from rival device makers and platforms.

Giving Users Choice and Putting Them in Control of Their Data

Our primary focus is our users. Even at this early juncture in the development of connected device technology, we see amazing promise in the power of technology to help consumers in ways big and small. And we believe that realizing the promise of this technology requires putting users in control of their experience.

For example, our Nest Learning Thermostat was built to put people in control of their energy consumption. It [helps them save](#) about \$131-\$145 a year in energy costs, reduces energy consumption, and helps address climate change. This shows how a product that many found unremarkable, a thermostat, can have an outsized impact when paired with leading-edge computing.

Sometimes putting the user in control can transform a person's life in profound ways. Take [Steve Saling](#). Steve was diagnosed with ALS nearly 15 years ago. Using our [AI-powered speech recognition advances](#), Steve can now activate his smart home devices with non-speech sounds. This technology can help millions of people with speech impairments caused by neurologic conditions such as stroke, ALS, multiple sclerosis, traumatic brain injuries, and Parkinson's. And for people living with [paralysis and mobility impairments](#), voice-enabled devices can be a game changer. In the [words](#) of [Chanda Hinton](#): "As a woman living with a disability, I never felt comfortable answering my door or letting someone into my house. Google allows me to see who is at my front door so I can feel more secure and confident living on my own. When you are paralyzed, your most powerful tool is your voice."

Choices About Which Products to Use

Helping users control their experience also means providing them with meaningful choices about which products to use and how to use them, including when those products come from our rivals. That has been Google's approach when it comes to voice assistants, for instance. Many companies preload their own voice assistant on their devices, including Siri on Apple devices, Alexa on Amazon devices, Cortana on Microsoft devices, Bixby on Samsung devices, Celia on Huawei devices, and Xiao AI on Xiaomi devices. Google's first-party devices similarly come with Google Assistant.

But on a range of devices running Android, consumers can choose to set up rival voice assistants like Amazon's Alexa, and even set those as default. Google Play even distributes the Amazon Alexa [app](#) to Android devices, where it's been downloaded more than 50 million times. And some [Android devices come with Alexa](#) built in.

Consumers have more choices than ever when it comes to voice assistants, which appear in an increasing number of products. Two months ago, Spotify announced a "new voice-controlled experience called ["Hey Spotify."](#) In February, Facebook rolled out ["Hey Facebook"](#) to activate its Portal smart home devices. Last fall, the [Microsoft Store](#) released [Beeb](#), an [Azure-powered](#) voice assistant for the BBC activated by saying ["OK Beeb."](#) And in 2019, [Sonos](#) acquired voice assistant company Snips to improve the voice experience on Sonos devices.

Android Auto, our connected car service, lets consumers choose between rival services. Drivers using Android Auto can navigate with [TomTom AmiGo](#) – a Google Maps rival. As one commentator recently [noted](#): "By opening up Android Auto for third-party developers, Google essentially allowed software makers to release alternatives even to its own apps, including Google Maps[.]" Thousands of applications are already compatible with Android Auto, and our goal is to allow even more developers to make their apps available over time.

When it comes to smart wearable devices, today a range of our Fitbit devices support [Amazon Alexa and Google Assistant](#), letting consumers choose. Our WearOS operating system [works with Apple's iPhone](#), a competitor, giving users the option of pairing a watch running WearOS with either an iPhone or an Android phone. That means more options for consumers, whether it's choosing which device to buy or picking which apps and watch faces to display.

And, as I mentioned earlier, we've recently made [significant progress](#) in supporting openness across a broad range of smart home devices. We're optimistic that [Matter](#), an interoperable standard for smart home devices, will lead to a more helpful and open smart home for everyone.

Putting Users in Control of Their Data

People who use our services trust us with their data, and it's our responsibility to protect it. We take this responsibility seriously, helping users [control](#) their data. And as technology reaches even more aspects of life, privacy and security are even more important. We're proud of our industry-leading [protections and innovations](#) in this area, helping people control how their data is used, even in a screenless environment.

We believe that products should keep users' information only for as long as it's useful and helpful. That's why last year, we decided to change our data retention practices for Web & App activity and make auto-delete the default for all of our core services, including Google Assistant. For new users, that means that by default, their Assistant activity will be automatically and continuously deleted after 18 months. If users prefer having their data being stored for less or more time, they can choose that in their settings.

For our voice assistant, we make it easy for people to choose the privacy settings that work for them. People can ask the Google Assistant questions like: "[Where can I change my privacy settings?](#)" to get answers to the most common privacy and security questions. And we make it easy for people to change their privacy settings or delete their activity at any time. Using the Google Assistant, people can delete their recent activity just by saying: "[Hey Google, delete this week's activity.](#)" And they can pause any saving of their Assistant activity to their account just by saying: "[Hey Google, turn on Guest Mode.](#)"

Across Google's products, our world-leading [security measures](#) are designed to automatically stop threats before they reach a user. Advanced encryption keeps data safe in transit, proactive security alerts help protect private information, and our Safe Browsing technology automatically detects and blocks threats--protecting over 4 billion devices every day.

And we share many of our privacy and security innovations freely with others. This helps advance the state of technology for everyone--even our competitors. Take [differential privacy](#), for example. Differential privacy is a privacy protective technology that gains insights from data without compromising user anonymity. We spent over a decade building the world's [largest library of differential privacy algorithms](#), and have open-sourced our library so others can apply these same privacy protections in products other than ours.

As an industry, we've recognized that security needs to be at the heart of connected devices as they become part of our everyday lives. That's why we, along with a range of other companies, are deeply involved in the [Internet of Secure Things alliance](#). Together, we've developed baseline security standards and a compliance program to help ensure connected devices like light bulbs, refrigerators, air conditioners, and phones are safe for users.

We'll continue doing more to bring the best of Google's privacy and security technologies to everyone, in the smart home and beyond.

Helping Other Companies Thrive Through Open Platforms and Interoperability

Google has a proud history building open platforms that enable others to build thriving businesses at incredibly low cost. For Google, openness and innovation have gone hand in hand since the beginning, and as our platforms have grown, they've remained fertile ground for innovation by others. As we look ahead, we're doing our part to share our technology with companies building great connected products.

In 2008, we launched Android as a free, open-source mobile operating system, challenging the vertically-integrated walled gardens of the time with a brand new approach. Today, Android is the foundation for a thriving ecosystem, with more than 3 billion active devices around the world. Consumers can choose from over 24,000 device models, some selling for as little as \$100. Android users can choose between multiple app stores as well, something that distinguishes Android from competing platforms that are closed.

Similarly, our Chrome browser is built on Chromium, a free, open-source browser platform that powers over [two dozen rival browsers](#), from large incumbents like Microsoft's Edge and Amazon's Silk to smaller upstarts like Brave and Vivaldi, lowering barriers to competition and increasing choices for consumers.

And we've put Google's machine learning innovations in the hands of companies all over the world by freely open-sourcing our machine learning system [TensorFlow](#) and our cloud hosting system [Kubernetes](#) – spurring [competition](#) and [innovation](#) across the cloud industry. Likewise, with R&D spending of almost \$28 billion last year, Google pioneers fundamental science and technology research. But we share much of our hard-earned learnings freely and openly to advance science for everyone. We've [published](#) over 7,000 research papers, and shared over 90 [massive datasets](#). According to [one estimate](#), Google publishes more leading AI research than Stanford and MIT combined. We've long believed this sort of openness benefits other companies, consumers, and the wider economy.

We're carrying that approach forward to the next generation of connected services, hoping that openness will again catalyze innovation in a young and rapidly growing sector.

Google Assistant, for example, offers new ways for consumers to interact with and use products from thousands of companies, expanding access to those companies' services and helping them innovate. And we provide it at no cost to the businesses using Google Assistant. We've opened Google Assistant to [developers](#) like Zynga and [device makers](#) like iRobot, helping them grow their businesses and giving consumers more choices. Google Assistant

now works with [50,000 smart home devices](#) from more than 10,000 brands. And consumers can use Google Assistant to perform over [1 million actions](#), making it easy to set alarms, get directions, make a call, secure their home, control appliances and entertainment systems, or check sports results with a simple command.

And we continually invest in new tools to give developers even more capabilities. Android developers can easily integrate their apps with the Google Assistant, helping consumers get things done. The [eBay](#) app is one example, where the Google Assistant facilitates an end-to-end shopping experience for eBay users. And [Walmart](#) app users can say “Hey Google, reserve a time slot with Walmart” to schedule a grocery pickup.

We’re also helping to spur the next generation of innovation in this space. Our [Google for Startups Accelerator: Voice AI](#) program is helping a diverse set of [12 voice startups](#) accelerate their work tackling complex challenges across accessibility, education, and care.

Global Competition in a Nascent, Growing Sector

The connected device space is dynamic and competitive. Today, the average smart home has nine [smart devices](#), up from three in 2016. The number of IoT startups and related businesses [grew 27%](#) in 2020. [Companies small and large, young and old](#) are competing across a range of industries, including automotive, consumer devices, energy, healthcare, manufacturing, and security.

I’ll focus on a few examples.

Nearly [70%](#) of US smart speaker users will use an Amazon Echo device in 2021, according to an eMarketer estimate. More than [100 million](#) smart home devices are connected to Amazon Alexa. And Apple has [claimed](#) that Siri, featured on Apple’s smart speakers and iPhones, is the most popular voice assistant in the world. Other companies make smart speakers too, including Belkin, Bose, LG, Harman Kardon, and Sonos.

Beyond smart speakers, Facebook and LG have released smart display devices. And there are smart lights and switches from Philips Hue, TP-Link, Sengled, Geeni, Feit, Lutron, and Ring; smart security and monitoring devices from Ring, Blink, Wyze, Arlo, ADT, Alarm.com, and Chamberlain; smart energy devices from Honeywell, Ecobee, Emerson, Kidde, and Lutron; and smart media devices from Microsoft Xbox, Roku, Samsung, LG, Vizio, Verizon Fios TV, DTV, Dish, and Sony Playstation.

A wide variety of large and small companies are powering growth in wearable devices like smartwatches and fitness trackers. Over [100 million wearables](#) shipped in Q1 of 2021, up 34.4%. According to IDC, “While market leaders like Apple and Samsung maintained

double-digit market shares during the quarter, [most of the growth came from smaller companies](#).” Huawei is a major player in this space, with shipments up more than [31%](#) last quarter. [Amazon](#) and [Garmin](#) are also active in this space.

There’s also significant competition among companies providing connected platforms and services for cars, including [Apple](#), [Amazon](#), [Microsoft](#), [LG](#), [Cerence](#), and more. More than [600 car models support Apple CarPlay](#), and more than [350 million cars](#) have shipped with Cerence technology.

Among industrial applications of IoT technology, some [estimate](#) an annual economic impact of up to \$11.1 trillion in 2025 from IoT applications, with customers--like factory owners using IoT-guided machines, operators of remote transportation fleets, doctors using smart medical devices, and consumers--capturing more than 90% of that value. Competition in this space is robust. Microsoft, Amazon, Cisco, IBM, Oracle, and Salesforce all offer [popular IoT platforms](#).

Conclusion

I’m grateful for the opportunity to appear before this Committee. Connected devices show incredible potential to serve consumers in moments that matter, and in ways that were unimaginable three decades ago when Americans first got a taste of computing in their homes. We’ve come a long way since then, but we’re still in the very earliest days of an exciting period of competition, growth, and innovation.

America’s success in the years ahead isn’t guaranteed. Competition is fierce in this space, and American companies face stiff pressure from companies around the world. For example, Huawei is building an operating system to ensure China becomes “[the most advanced nation](#)” in the IoT space, according to Huawei’s president of consumer software. Huawei officially launched HarmonyOS on June 2, and said it aims to deploy HarmonyOS on 300 million devices by the end of the year.

The United States can help this sector thrive by encouraging platform openness as a way to unleash innovation and consumer choice. But that won’t be enough to preserve America’s global technological leadership in a field that will define the future of how people around the world access technology to improve their lives. American leadership will require investments in the technologies underlying these products, including semiconductors, encryption, ambient computing, machine learning, and artificial intelligence. We welcome this Committee’s interest in creating the right environment for American companies and consumers to continue investing in this new, rapidly evolving space so it can thrive.

Thank you again for inviting Google to participate in this discussion. We look forward to continued engagement with this Committee on these important issues.

Senator Blackburn
Questions for the Record to Ryan McCrate
Vice President and Associate General Counsel, Amazon

1. What is Amazon's largest source of profit, and how much income does Amazon produce in that business?
2. Amazon produces smart, multi-room speakers, comparable in some respects to those of Sonos. Often, Amazon's product appears to be cheaper, how much money does Amazon make selling smart speakers?
3. How much does it cost Amazon to produce a smart speaker? How much does an individual smart speaker sell for?
4. Amazon is suspected of predatory pricing enabled by cross-subsidizing their speaker business. Has Amazon ever sold its speakers below cost, and how often does this occur?
5. The primary purpose of a speaker is sound, therefore a speaker's most important attribute must be sound quality. Would you consider the sound quality of your company's speakers to be generally lower, higher, or the same as comparable speakers produced by Sonos?
6. Amazon harvests and controls an immense amount of data from users of its online market place and associated products. Smart home devices and their associated home ecosystems create another source of massive data collection. Amazon often partners with other companies to put the Alexa AI assistant on their products. What kind of data does Amazon collect from these other companies' products?
7. Amazon would know what kinds of smart appliances are in a user's home through the shared AI assistant network. How does that kind of data inform what products Amazon pushes on its customers?
8. Amazon collects massive amounts of data through their AI assistants on its smart home devices and partnered products. Much of this data is valuable for selling advertising, general market information, or feedback used to improve products. Recently, the largest tech firms have been accused by smaller firms who do business with them of using certain privacy rules and regulations as pretext for anticompetitive behavior. These critics often describe the relationship as a one-sided with one party monopolizing data that was created through the business partnership. Does Amazon believe it has the exclusive right to data collected through its voice activated AI assistant even if it was collected through a partnered company's product?

Protecting Competition and Innovation in Home Technologies**Hearing before the Senate Committee on the Judiciary, Subcommittee on Antitrust,
Competition Policy, and Consumer Rights**

June 15, 2021

QUESTIONS FROM SENATOR BLUMENTHAL**Questions for Mr. McCrate**

1. Amazon provides one of the largest marketplaces for electronics and provides the Alexa voice assistant to third-party companies. At the Internet of Things hearing, I also asked you whether Amazon has data firewalls in place to ensure that it does not use competitors' data against them or rig the system for Amazon's own products. You stated that you "know that [Amazon] ha[s] to use the data that [Amazon] receive[s] appropriately in order for third parties to continue to work with us and make their services available," and added that Amazon focuses "on using the information [it] receive[s] through customer's use of Alexa to improve Alexa overall, including for our third-party partners."
 - a. What are the circumstances when Amazon shares data collected from third-party software developers with Amazon's own product developers? What data is shared? What limitations are placed on the use of the data for competitive purposes?
 - b. What are the circumstances when Amazon shares data collected from third-party software developers with Amazon employees other than its own product developers? What data is shared? What limitations are placed on the use of the data for competitive purposes?
 - c. How does Amazon use data collected from third-party software developers to inform its own product development?
 - d. What are Amazon's policies on the use of data collected from third-party software developers?
 - e. Where are the Amazon's policies on the use of data collected from third-party software developers located?
 - f. Do third-party software developers have the ability to challenge or appeal Amazon's use of their data for its own competitive purposes?
2. A key feature of voice assistants such as Amazon Echo is the "skills library," which enables Echo speakers to recognize and complete thousands of tasks from simple voice commands. One popular set of commands is shopping, where users can ask Alexa to

purchase products, prepare grocery lists, and track orders directly through their speakers. But this convenience comes at a direct cost to competition. When users buy products through their Alexa-enabled device, Amazon not only favors its own products, but overwhelmingly recommends its private label—AmazonBasics. For example, the *New York Times* reported in 2018 that when a consumer says, “Alexa, order batteries,” it will default to ordering AmazonBasics batteries through the Amazon marketplace. Today, approximately 90% of the batteries sold on Amazon are AmazonBasics.

- a. Does Alexa only prefer Amazon products when they are less expensive than competitor products?
- b. Where can a competitor go to find out the specific rules of product recommendations for voice assistants, so competitors can find out why it was not selected by Alexa and, for example, offer consumers a better deal?

**Senator Josh Hawley
Questions for the Record**

**Ryan McCrate
Vice President and Associate General Counsel, Amazon**

- 1. As of June 22, 2021, what third-party devices is the Amazon Sidewalk network ultimately anticipated to support? Please provide a specific list of devices broken down by manufacturer.**

- 2. For each of the following dates, please provide a list of Amazon Echo smart speaker models, or any comparable or predecessor Amazon-branded smart speaker products, on the market at that point, along with the cost of production of an individual unit of each model as of that date. Do not include costs associated with shipping the device to end users.**
 - a. January 1, 2019**
 - b. April 1, 2019**
 - c. July 1, 2019**
 - d. October 1, 2019**
 - e. January 1, 2020**
 - f. April 1, 2020**
 - g. July 1, 2020**
 - h. October 1, 2020**
 - i. January 1, 2021**
 - j. April 1, 2021**
 - k. June 22, 2021**

- 3. For each of the following dates, please provide the consumer list price of each Amazon Echo smart speaker model on the market at that point. Do not include charges for shipping the device to end users.**
 - a. January 1, 2019**
 - b. April 1, 2019**

- c. July 1, 2019
- d. October 1, 2019
- e. January 1, 2020
- f. April 1, 2020
- g. July 1, 2020
- h. October 1, 2020
- i. January 1, 2021
- j. April 1, 2021
- k. June 22, 2021

4. Please indicate whether, at any times between January 1, 2019 and June 22, 2021, any Amazon Echo smart speaker models were placed on sale by Amazon, and if so, for how long and what list price was charged to consumers at each relevant point.
5. Does Amazon provide unified access to competitor digital services through its smart home products? If so, which specific competitor digital services do Amazon's smart home products support?
6. For each of the aforementioned competitor services, please state whether those services—to the extent they offer features comparable to those of Amazon's own services being offered in the same markets—currently have levels of functionality equal to those of Amazon's own services, when running on Amazon's smart home products.

JON OSSOFF

U.S. SENATOR FROM GEORGIA

Judiciary Committee

Antitrust Subcommittee

Hearing: Protecting Competition & Innovation in Home Technologies

Questions for the Record

June 22, 2021

Questions for Mr. Ryan McCrate, Vice President & Associate General Counsel, Amazon:

Device tracking on local networks:

1. For Amazon's Eero Wi-Fi mesh network systems and/or any Amazon devices using wireless communication protocols other than Wi-Fi, such as Zigbee, Z-Wave, or Bluetooth:
 - a. Do Amazon, its affiliates, or their devices track the relative location of Amazon devices or other mobile devices (whether phones, tablets, wearables, or other connected devices) connected to the same wireless network?
 - b. If so, do the devices keep or transmit to Amazon any records of an individual device's location? If so, where and how long are such records kept?
 - c. If Amazon's router system assigns device identifiers to individual devices, do these identifiers remain constant? If not, by what means does Amazon change device identifiers, and how often are they changed?
 - d. Using any records available to Amazon of a device's location within the wireless range of an Eero Wi-Fi network and/or a network on which Ring devices operate, would it be possible to create a map depicting a device's relative physical location within the network's range?

Use of audio/video for object or facial recognition

1. When Amazon obtains audio data by way of a smart home device, whether that data was collected through the device's sensors, transmitted from another device, or generated by the device, how does it use that data?
 - a. Does Amazon use this or other audio data to develop, train, or test speech recognition technology other than Alexa? If so, please elaborate.
 - b. Does Amazon use this or other audio data to develop biometric identifiers such as "voiceprints"? If so, please describe any purposes for which Amazon or its affiliates use these identifiers other than to enable personalized controls for Alexa.
 - c. Does Amazon produce or use transcripts of audio data for any purpose? If so, what are they? Does Amazon use these transcripts for purposes other than personalized advertising?

JON OSSOFF

U.S. SENATOR FROM GEORGIA

2. When Amazon obtains video or image data by way of a smart home device, whether that data was collected through the device's sensors, transmitted from another device, or generated by the device, how does it use that data?
 - a. Does Amazon use this or other video or image data to develop, test, or train biometric identification or object recognition systems?
 - b. If a customer requests the deletion of video data collected by way of an Amazon smart home device or system, does Amazon also delete any data product or model derived from that data, such as a voiceprint, faceprint, or other biometric attribute profile?
3. Has Amazon ever provided audio or video recordings or transcripts of audio recordings collected by way of smart home systems or devices to law enforcement?
 - i. If so, was this to comply with a court order?
 - ii. If Amazon has ever provided law enforcement access to audio or video recordings or transcripts without a court order, what policy, if any, describes the circumstances under which Amazon provides such access?

Sale of Collected Data

1. Please describe Amazon's policies and procedures for selling, granting access, or otherwise making available any location, image, video, audio, or other data that Amazon or its affiliates obtain by way of a smart home device to third parties and/or Amazon affiliates, including any restrictions on the types of data sold, accessed, or made available, restrictions on eligible purchasers/receivers of the data, efforts to anonymize or aggregate the data, and any related notices to users.
2. If Amazon does not sell, grant access, or otherwise make available data obtained by way of smart home devices, please describe the circumstances in which Amazon sells, grants access, or otherwise makes available to third parties any data or data products *derived* from smart home data, as well as any policies and procedures relevant to that sale or access.

**Questions for the Record from Senator Thom Tillis
For Ryan McCrate of Amazon**

1. What percentage of the books that appear as ads on the Kindle device – namely on the home screen as a screen saver -- are published by Amazon Publishing imprints or on the Kindle Direct Publishing platform? What do you charge for that placement and do you charge Amazon imprints the same as other publishers?
2. Bookstat, a sales tracking service that covers about 90% of US ebook retail, estimated in 2018 that 9.5% of the ebooks sold in the US last year came from Amazon's imprints, yet at least a quarter (and often a half or more) of the top 20 bestselling fiction books listed by Amazon each week tend to be from its own imprints. Why do Amazon's own books dominate its best-seller lists each week? It seems to indicate that Amazon is giving preference to its own imprints where it stands to double profit from the sales – as both publisher and retailer. If Amazon were a neutral platform, you would expect the number of best-sellers sold on Amazon to be more proportionate to the percentage of the market that the imprints represent.

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Senator Thom Tillis
Question for the Record to Eddie Lazarus
Chief Legal Officer, Sonos

1. One very effective strategy that big tech companies and others use to gain and maintain their monopoly power is through the efficient infringement of the patents of innovative startups and smaller competitors. We have seen how this works through infringement cases brought by companies like Sonos and the cyber security company Centripetal. In each case, a cutting edge startup had to spend millions of dollars and many years to confront an entrenched incumbent that had simply taken their IP and used the current system of endless challenges at the PTO and legal maneuvers to slowly grind them down. This pattern has become standard operating procedure for big tech companies to kill off competition that should be coming from innovative new startups. Are there any changes to current law or additional tools that we can give innovative startups to better protect their patents and break this cycle of predatory IP infringement?

Sonos very much appreciates your recognition of a real and innovation-stifling problem that lies at the intersection of intellectual property (IP) and competition policy. The root cause of “efficient” infringement (or predatory infringement, as Sonos prefers to call it) is that the remedies available under current patent law doctrines are inadequate to deter large companies from massively infringing on the intellectual property of smaller competitors and daring them to sue. Regrettably, the big companies know that infringement pays off in the aggregate because (i) many companies don’t have the financial resources to litigate for years on end and therefore either settle prematurely or *don’t sue at all*; and (ii) when lawsuits *are* successful the damages awarded are rarely more than what a commercially reasonable license would be in the first place. Especially where the rewards from network effects or overall gains in market share are high, the economically *efficient* thing for large companies to do is to infringe – because, under current law, the gains from infringement outweigh the risk-adjusted consequences.

The only way to solve this problem is to change the calculation by making either or both (i) litigation faster and less expensive; and (ii) increasing the costs of infringement. The first approach is very difficult, but there are several ways to address the second. We detail them below.

Adjust the “Reasonable Royalty” calculation

Currently damages in a patent case are supposed to be “in no event less than a reasonable royalty” – i.e. what a willing buyer would pay a willing seller for a license to the patents. And, in

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the vast majority of patent cases, that is how the damages are calculated. But this approach misses a fundamental issue insofar as it *assumes* that the patent licensor is willing. There is no reason to make this assumption, and doing so gives the infringer an enormous, and unwarranted advantage. The reality is that in many situations companies (like Sonos) would prefer *not* to license their inventions to competitors and instead enjoy the lawfully granted exclusionary rights for the patented technology which form the very basis of the *quid pro quo* of the patent system. It is clear that calculating damages based on the idea that the infringer is *willing* to license benefits the accused infringer in the form of lower damages numbers. But it is not clear that this is economically sensible, much less equitable. The reasonable royalty framework is effectively a quasi-compulsory licensing scheme.

Make Lost Profits more accessible

For a plaintiff to get lost profits in a patent case, it must prove that the patented feature is the primary reason that customers purchase the product. Put differently, under current law, it is not sufficient to show that the patented feature is a *significant* reason that customers purchase the product, or even that customers would not purchase the product without the patented feature. Instead, a plaintiff must affirmatively show that the specific feature is *why* customers purchased a particular product. The justification for this rule is the idea that, if the patented feature did not cause the lost sale, then the act of infringement did not result in lost profits to the patent owner. Stated this way, the rule is superficially appealing. But the rule is the result of an economically problematic oversimplification. The reality is that consumers vary in their preferences and the way they evaluate products is complex. Imagine, for example, that a patented feature increases sales of a particular device by 5%. Did the feature “cause” those sales? Even if you query customers right after a feature is introduced, they will tell you that they purchased the product because of the *constellation* of features. The addition of the patented feature resulted in some additional sales on the margin – but you aren’t going to find consumers who tell you that it is *why* they purchased the products. Instead, consumers will tell you that it contributed to their purchasing decision. But under the law, that simply isn’t good enough to get *any* lost profits. Put differently, the law assumes that the relationship between a patented feature and sales is binary – i.e. either the feature *caused* the sales or it didn’t – while the reality is that patented features almost always *contribute* to sales. Again, there is no reason for the law to simply assume something we know to be wrong about consumer behavior and how they evaluate products, and then bake that incorrect assumption into the requirements for showing lost profits.

Adjust how exemplary damages are evaluated

The legal standard for evaluating whether infringing conduct is willful and whether enhanced damages should be awarded has been in flux for some time. While the Federal Circuit recently

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clarified that willful infringement requires a showing that the infringer's conduct was deliberate and intentional, that is currently not enough to warrant enhanced damages. Instead, the Federal Circuit further requires conduct that is wanton, malicious, or in bad-faith. This standard is too high. In reality, the difficulty plaintiffs have in obtaining exemplary damages (coupled with the difficulty in showing lost profits) means that, even when they lose, defendants generally don't have to pay more than what a willing seller would charge a willing buyer. Put differently, even after a plaintiff drags a defendant all the way through litigation (and appeal, and Inter Partes Review) and wins, the defendant only has to pay the amount he or she would have paid **if the patent owner were willing to negotiate a license**. To fix this, Congress could make it clear that enhanced damages shall be awarded if the defendant's conduct was *willful* – i.e. if it was deliberate and intentional. That's what "willful" means – it doesn't mean malicious.

Rebalance Injunction Law: Prior to the Supreme Court decision *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006) the law of injunctions in patent cases favored patent holders. *eBay* introduced a more traditional equitable approach to injunctions in patent cases, including a showing of irreparable harm – i.e. a showing that the injunction was necessary to prevent a harm that could not otherwise be compensated with money. Sonos has no quarrel with many aspects of *eBay* and particularly supports its distinction between practicing and non-practicing entities, but we think the application of *eBay* has overtilted the scales against injunctive relief. To take one example, since *eBay*, the Federal Circuit has interpreted the law in a way that makes it virtually impossible to get an injunction where the accused feature is included in a multi-feature product. More specifically, in order to get an injunction a plaintiff now must show that the patented feature is the reason that customers buy the product. The theory behind this rule is similar to the lost profits rule – i.e. it is based on the idea that if the patented feature did not cause the sale, then the sale would still have taken place even without the act of infringement and thus the act of infringement did not cause the plaintiffs' lost market share.

This rule works well enough in cases where, for example, the patent is on a drug – because the drug's efficacy is *the reason* that consumers buy the product. So in drug cases between competitors, injunctions are generally available. But the causality standard is almost impossible to meet when it comes to a feature-rich product *because* (again) consumers don't buy a feature-rich technology product because of a single feature, no matter how inventive or novel it may be. Instead, consumers almost universally report that they buy products because of the *constellation* of features included relative to the price of the product. But, again, that does not mean that the patented feature did not contribute to the sales, or that the inclusion of the patented feature is not responsible for *some portion* of the lost market share. The law, as currently constituted, however, does not give any weight to that causality and instead treats the

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question as a binary one (in which a feature either fully causes the infringing sales and the irreparable harm or has no effect, causes no irreparable harm, and cannot be subject to an injunction). This makes no sense to us.

In our view, the solution is to focus on enjoining the infringement rather than the sale of the accused multi-feature product. Imagine, for example, that the law was modified so that (outside of the FRAND context), where plaintiffs can show that they are competitors and are successful they “shall” be entitled to an injunction against infringement. This would solve the problem from the plaintiff perspective, because it would get rid of the forward-looking compulsory licensing that patent law has created. But it would also be equitable to defendants, because it (i) would not create undue leverage for non-practicing entities and (ii) would narrow the scope of the injunction fight to the portion of the product that infringes. And it would be economically efficient because it would give the defendants the choice to drop the infringing feature, modify it so it wasn’t infringing or engage in mutually acceptable licensing discussions. This would be so much more efficient than (as we currently do) assuming that plaintiffs will license for the purpose of setting the royalty rate, and then preventing them from getting any injunctions at all based on a binary view of consumer behavior and purchasing decisions that we know is wrong.

Allow Context To Matter

The Big Tech companies are among the largest patent holders in the world and they use their portfolios not to challenge each other but to bludgeon smaller companies that dare to challenge them. Sonos’ experience is illustrative. Sonos pioneered the field of wireless multi-room home audio for years before Google contemplated entering the market, which it did with a series of products that currently infringe upward of 200 Sonos patents. After years of trying to get Google to agree to a fair license, we filed three lawsuits in the U.S. — an action involving five patents at the International Trade Commission, a companion case in federal court, and a second federal case involving a completely different set of four patents. Thus far, courts have adjudicated infringement with respect to seven Sonos patents. They have found Google to be infringing six of the seven. Google responded by filing five lawsuits of its own — in the U.S., Canada, the Netherlands, France, and Germany. I won’t belabor all the ways Google is abusing the international patent system by forum shopping the same patents all over the world. Suffice it for these purposes to say that Sonos has now won every case that has been adjudicated as well as partial victories in the cases where some issues are still pending. But Google has an inexhaustible supply of patents and so, having struck out so far, they have now filed not one but two cases at the International Trade Commission, involving another seven patents.

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The problem is that we can't tell a jury about Google's course of conduct. As interpreted by most courts, the evidence code prevents us from telling a jury (for example) that Google has sued us on six versions of the same patent and that five previous international courts have found that patent invalid or not infringed.

Context matters. In particular, it matters because, if companies knew that their overall behavior would be judged they would behave differently. But because courts generally interpret the evidence code so as to prevent plaintiffs from putting the conduct in front of the jury, there is no accountability. Again, the fix could be relatively straight forward: adjust the law so that facts surrounding how a defendant has dealt with a patent holder *in toto* can be considered by the jury in deciding the question of willfulness.

Allowing context to matter would also do quite a lot to tamp down the kind of retaliation that Sonos has received for daring to assert its rights. There can be no serious question that Google's grossly disproportionate response, which has and will continue to impose huge costs on Sonos, is designed both to punish Sonos for successfully challenging Google's misappropriation of Sonos's IP and as retaliation for Sonos taking a lead role before Congress in advocating for antitrust reform. To our knowledge, Google has never brought a case before the ITC; now it has brought two against Sonos. Especially if we are going to require Sonos to prove that Google's conduct is "deliberate" and "intentional" we should allow Sonos to tell the jury the facts about Google's conduct. At minimum, Sonos must be able to tell the judge about Google's conduct when the judge decides whether to enhance damages.

Sonos knows that this Committee does not take sides in pending litigation; nor should it. But in addition to considering the intellectual property reforms outlined above, Congress could at least level the playing field a bit by passing the moderate and sensible reforms contained in S.2992, the American Innovation and Choice Online Act. Sonos wants nothing more than the chance to compete — our innovations against those of others — but that means having a fair chance to protect our innovations and not being subject to all sorts of predatory conduct by the dominant platforms that squelches smaller rivals.

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**Senator Blackburn
Questions for the Record to Eddie Lazarus
Chief Legal Officer, Sonos**

- 1. Recently, Sonos has filed several patent infringement lawsuits against Google, alleging that Google is infringing wireless audio patents across its line of Nest and Chromecast products. What kind of technology does your company allege Google has stolen?**

Sonos pioneered the field of multi-room home audio — the ability to play audio content throughout your home wirelessly — more than a decade before Google entered the market that Sonos had largely defined. Since Google started selling its devices (the Home, Home Mini, Home Max, and Nest line of smart speakers) it has added one functionality after another that Sonos invented and patented. Sonos has provided Google with claim charts showing Google's use of roughly 100 Sonos patents covering a wide range of both foundational inventions that enable multi-room wireless home audio technology and some of the most popular features of Sonos' services. The patents we have asserted in litigation cover a cross-section of these inventions and include patents directed to how smart speakers are discovered and joined to a network; how wireless smart speakers are synchronized; how speakers can be flexibly grouped and invoked for playback; the equalization of speakers; the way in which music is queued and stored for playback; and the ability to seamlessly transition from playing music on a portable device (like a phone) to your speaker system as you walk in the door of your house.

- 2. Could you estimate Sonos' loss in revenue resulting from this alleged infringement and what effect did this have on Sonos' market share?**

We have not attempted to calculate a specific dollar loss attributable to all of Google's infringement, but Sonos' loss of market share has been enormous. Back in 2015, Sonos owned significant market share over competitors like Bose — which was a direct result of the fact that Sonos **created** the wireless, multi-room smart speaker category in the first instance. Amazon entered the market in 2016 with the Amazon Echo, followed quickly by Google with the Google Home in 2017. The entry of these two dominant firms had profound negative effects upon Sonos market share.

Not all of the decline in Sonos' market share is due to Google's infringement. But the fact that Google has taken so many of Sonos' inventions and then packaged them in speakers which Google has sold at cost, or sold at a loss, has been a major contributor to Sonos' declining market share. Put differently, in our view Google has decided that it does not care about

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margins in the smart speaker business. Instead, Google views smart speakers and their capacity to recognize voice commands as a gateway to its dominant position in search, and as a way to monopolize the interface to “smart” appliances in the smart home. Google wants to gain as much control over this interface as it can. And to do that, it has copied Sonos’ patented technology and sold that technology at a loss in order to gain that market share. And it has been enormously successful in doing so.

3. Has Amazon engaged in similar conduct or infringed on Sonos’ patented technology?

Sonos believes that Amazon is also infringing many Sonos patents and has provided Amazon with claim charts to substantiate that view. Amazon has also, like Google, been fighting a battle for control of consumer interactions with the smart home. Its strategy has been similar to Google’s insofar as it has taken Sonos’ inventions and put them into lower cost speakers which Amazon has priced with a view towards gaining market share rather than making a profit.

4. What is Sonos’ primary source of revenue, and what percentage of the company’s revenue comes from speaker sales?

Sonos’ revenue derives almost exclusively from selling speakers, soundbars, and audio components such as amplifiers. In our Fiscal Year 2021, Sonos’s global revenue was \$1,716,744,000, of which \$890,837,000 was in the United States. Speakers represented 80% of Sonos’s revenue and system components (including amplifiers) represent an additional 19%. Both Sonos speakers and system components utilize the patents under dispute with Google - Sonos works as a system. Our amplifiers work seamlessly with our smart speakers, and vice versa, and that is one of the main benefits of Sonos. It is an excellent and easy customer experience.

5. Both Google and Amazon now produce smart, multi-room speakers to compete with Sonos. Often, Google and Amazon’s products appear to be cheaper and both companies are suspected of predatory pricing enabled by cross-subsidizing their speaker business. What is the profit margin on Sonos’ speakers?

Sonos targets a “gross margin” for its products, meaning net sales minus the costs to produce the goods at 45-47%. Sonos’ EBITDA margin, a non-GAAP measure of profitability, was 11.3% in our most recent fiscal quarter (Q3 FY22). We agree with your observation that Google and Amazon engage in potentially predatory pricing behavior through the cross-subsidization of their speaker products, which are sometimes sold below cost and even

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given away for free in order to build out the moats protecting their lucrative monopolies in related markets.

6. Has Sonos had to lower prices to compete with comparable products produced by Google and Amazon?

Sonos cannot compete with Google and Amazon on price because we do not have dominant businesses from which to cross-subsidize our speaker sales and we do not use the data from our smart speakers, as Google and Amazon do, to create value in some other dominant business, such as search, search advertising, or e-commerce.

7. Other than the speaker hardware and the proprietary software used to control the speakers, does Sonos have other products or services such as a music streaming service or AI assistant?

Sonos operates as a platform providing consumers the choice to listen to more than 100 music services. Sonos has a nascent streaming service called Sonos Radio that is available on Sonos products. Sonos Radio is a free service supported by advertising and Sonos Radio HD is a subscription offering. Radio represents a small fraction of our revenue and is still a new offering. We have a small number of owned and operated channels in which we set the programming on Sonos Radio, for example, featuring playlists by notable musical artists.

Sonos does offer a voice assistant on its voice-enabled products called Sonos Voice Control. Sonos Voice Control was designed to be the simplest way to control your music and your Sonos system, putting speed, accuracy and privacy on equal footing. Sonos Voice Control works just like the Sonos app, offering complete command of your Sonos system using only your voice. Control your music and speakers in any room, easily move music around your home, save and like your favorite songs to your personal music library and more. Lastly, Sonos Voice Control is built with privacy in mind. Sonos Voice Control processes your voice and understands your requests entirely on the speaker. No audio or transcript is sent to the cloud, stored, listened to or read by anyone, so all your conversations will remain private. Sonos Voice Control, however, is not an ask-anything voice assistant like Amazon Alexa or Google Assistant. It is limited to music.

8. To create user preference for a certain products, Google and Amazon are incentivized to create limited interoperability for devices outside of their respective smart home ecosystems centered around their AI assistants. On some levels, both Google and Amazon are partners through their music streaming

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services and AI assistants. Did this relationship change once both companies entered the smart speaker market?

Google limits interoperability in two important ways.

First, as also discussed in our answer to Question 9, Google contractually limits the interoperability of Google Assistant on Sonos devices. Sonos has developed a consumer-friendly technology that would allow multiple voice assistants to exist “concurrently” on our speakers — meaning that a user may activate and seamlessly move back and forth between whichever voice assistant that user prefers simply by uttering the relevant “wake word,” such as “Hey Google” or “Hey Alexa” or “Hey Sonos.” Google contractually prohibits Sonos from making Google Voice available concurrently with Alexa on our products. This prohibition forces users to select a “default” voice assistant in the Sonos app rather than simply being able to activate the voice assistant of choice through an easy voice command. By limiting Sonos in this way, it deprives Sonos of the ability to offer the unique consumer benefit it invented.

Second, Google is planning to introduce technical requirements to Google Assistant that will make it harder to interface with Sonos products. The specific details of this development are confidential and thus are not contained in this response. However, Sonos would be happy to provide more information about this development in a format that would preserve its confidentiality.

Sonos continues to offer its customers both YouTube Music (Google) and Amazon Music as choices on its platform.

9. Has either Amazon or Google leveraged their partnership with Sonos to create preference for one company’s service over others?

Yes. Sonos has developed a consumer-friendly technology that would allow multiple voice assistants to exist “concurrently” on our speakers — meaning that a user could activate and move seamlessly between whichever voice assistant that user prefers simply by uttering the relevant “wake word,” such as “Hey Google” or “Hey Alexa” or “Hey Sonos.” Google contractually prohibits Sonos from making Google Voice available concurrently with Alexa on our products. This prohibition forces users to select a “default” voice assistant in the Sonos app. Sonos believes that Google forces this default selection because it believes that more Sonos users will default to Google Assistant (prioritizing search) than Alexa (prioritizing e-commerce). And because defaults in an app are “sticky” more users will end up going into

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the Google ecosystem than into the Amazon ecosystem than would be the case in a concurrent arrangement.

10. Does Sonos collect any data on user music preferences or feedback through its smart speakers, and does any of this data come through the use of Google or Amazon's voice activated AI assistants?

Sonos does collect a modest amount of customer data through its speakers (what music a customer plays, for example), which it uses to optimize our customer's listening experience. Sonos does not sell customer data to third-parties. Sonos does not obtain data from customers when they activate Google's or Amazon's voice assistants on our speakers. That data goes straight to Google or Amazon.

GOOGLE'S SUBMISSION IN RESPONSE TO
SUBCOMMITTEE QUESTIONS FOR THE RECORD
FOLLOWING June 15, 2021 HEARING

The Honorable Jon Ossoff (D-GA)

Device tracking on local networks:

1. For Google's Nest Wi-Fi systems and/or any Google devices using wireless communication protocols other than Wi-Fi, such as Zigbee, Z-Wave, or Bluetooth:
 - a. Do Google, other Alphabet-owned entities, or their devices track the relative location of its own or other mobile devices (whether phones, tablets, wearables, or other connected devices) connected to the same wireless network?
 - b. If so, do Google's devices keep or transmit records of the location of its own or other connected devices over time? If so, where and how long are such records kept?
 - c. If a Google device or system assigns identifiers to other individual devices, do these identifiers remain constant? If not, by what means does Google change device identifiers, and how often are they changed?
 - d. Using any records available to Google of a device's location within the wireless range of a Nest network, or a network on which Nest devices operate, would it be possible to create a map depicting a device's relative physical location within the network's range?

People who use our services trust us with their data, and it is our responsibility to protect it. We take this responsibility seriously and provide users with transparency, choice, and control over their data (for more information on the information and choices we provide users concerning their data, please see <https://myaccount.google.com/data-and-personalization>). We are proud of our industry-leading protections and innovations in this area, helping people control how their data is used, even in a screenless environment such as Google Assistant (more information is available at <https://myaccount.google.com/yourdata/assistant?pli=1>). Over 1 billion users have reviewed their Google privacy settings. Every day more than 20M people visit their Google Account page, where they can review their privacy settings and choose to delete data stored with their account.

As explained in our Privacy Policy (available at <https://policies.google.com/privacy?hl=en-US#footnote-deliver-services>), we use location information to help us interact directly with users, deliver our services, and ensure our products are secure and reliable. User location information, determined with varying degrees

of accuracy, may come from signals such as a user's IP address or device location, and also past activity on Google sites and services. The types of location data we may collect depend in part on the user's device and account settings. For example, a user may turn an Android device's location on or off using the device's settings app. A user may also turn on Location History to create private maps of places visited with their signed-in devices. For more information on how Google uses location information, please see <https://policies.google.com/technologies/location-data?hl=en-US>.

A user can also use the presence sensing feature with their smart-home devices (see <https://support.google.com/googlenest/answer/10000312?hl=en>) and use their phone location and sensors in supported home devices to help determine whether or not they are home or away. Presence sensing can help a user's home devices adjust to the user's needs when they are home versus away; for example, to change the thermostat temperature settings and shift into energy savings mode when the user is away. More information about presence sensing and Home/Away Assistant on Google's smart-home devices is available at <https://support.google.com/googlenest/answer/10000312?hl=en#zippy=%2Cpresence-sensing-and-how-its-used-for-your-home-away-routines>).

Last, we also believe that products should keep users' information only for as long as it is useful and helpful. That is why last year, we decided to change our data retention practices for Web & App activity and location history, and make auto-delete the default for our core services, including Google Assistant (for more information, please see <https://blog.google/technology/safety-security/keeping-private-information-private/> and <https://blog.google/technology/safety-security/automatically-delete-data/>). For new users, that means that by default, their Assistant activity will be automatically and continuously deleted after 18 months, unless they specify a different retention period. Users can choose to customize their data storage settings to better fit their preferences.

Use of audio/video for object or facial recognition

1. When Google obtains audio data by way of a smart home device, whether that data was collected through the device's sensors, transmitted from another device, or generated by the device, how does it use that data?

When Google obtains audio recordings by way of its smart connected home devices (for a full list of Google's smart connected home devices, please see https://support.google.com/googlenest/answer/9327662?p=connected-devices&visit_id=637592933074162338-3477167050&rd=1), Google uses these audio recordings to provide the services expected by our users, and we do so consistent with the user's permissions and settings, and Google's Privacy Policy. Such uses include those relating to providing features and services, such as allowing the use of Nest Cam or Nest Hello doorbells for home monitoring purposes, voice calling from smart home devices, or interactions with Google

Assistant. For Nest Cams and Nest Hello doorbells, user audio recordings stored in a user's Google Account are only used to provide services and features and not for Google's advertising purposes.

Google Assistant on Google's smart home devices uses audio recognition technologies to process audio recordings to detect when a user wants the Assistant's help and then to respond to the user's request. Audio recordings from Assistant interactions are not saved by default. A Google user can expressly give consent (revocable at any time) to store audio recordings from their interactions with the Google Assistant on smart home devices and allow Google to use their saved audio recordings to develop and improve Google's audio recognition technologies. More details on how Google Assistant uses audio are available at <https://safety.google/assistant/> under "What's the benefit of saving my audio recordings to my Google Account?" Importantly, Google's policies allow users to control when and how Google saves any audio recordings relating to interactions with Google Search, Assistant, and Maps. Details are provided in the Google Account Help Center, available at <https://support.google.com/accounts/answer/6030020>. Google also offers a feature called Voice Match, through which users can teach the Google Assistant to recognize their voice in order to use voice commands to get personalized results with devices such as speakers, Smart Displays, or Smart Clocks (for more information on Voice Match, please see <https://support.google.com/assistant/answer/9071681>).

At all times, a user can review and delete their stored audio recordings collected via Google's smart home devices either through the Nest app (in the case of Nest Cam recordings, see <https://support.google.com/googlenest/answer/9219185?hl=en>) or the My Google Activity site for interactions with the Google Assistant (see <https://myactivity.google.com/myactivity>). The user can also delete their Google Assistant activity with voice commands (for details, please see <https://support.google.com/assistant/answer/7108295>).

a. Does Google use this or other audio data to develop, train, or test speech recognition technology other than Google Assistant? If so, please elaborate.

As previously noted, the "Include audio recordings" sub-setting associated with the Web & App Activity control in the user's Google Account (see <https://support.google.com/accounts/answer/6030020?hl=en&co=GENIE.Platform%3DAndroid>) is off unless the user chooses to turn it on. When this audio recording setting is off, voice inputs from interactions with Google Search, Assistant, and Maps are not saved to the user's Google Account, even if the user is signed in. Moreover, the user can change this setting from on to off at any time. Users can also delete their audio recordings manually or set up an auto-delete option in their My Google Activity settings.

As explained above (and in the Google Account Help Center), a user can choose to save audio recordings from their voice interactions with Google Search, Assistant, and Maps to their

Google Account (see <https://support.google.com/accounts/answer/6030020>). This saved audio is used to help Google develop and improve its audio recognition technologies and the Google services that use them, including Assistant, Search, Maps, and other Google services that use speech recognition, including accessibility features like closed captioning for YouTube. As one example of how saved audio helps Google improve speech recognition technologies for all users, Google has improved automatic speech recognition for data-scarce languages by training a single model on audio from data-rich languages, which allowed for real-time multilingual speech recognition. To reiterate the points made above, this saving and/or use of audio for product improvement by Google occurs only with user consent.

Separately, with respect to Nest camera products (Nest Cams and Hello doorbells), as explained in the Nest terms that supplement the Google Terms of Service (see <https://support.google.com/product-documentation/answer/9327735>), Google “only process[es] the Nest Cam Audio/Video Data in accordance with your instructions, which include providing the Nest Cam features and services you have requested.” Nest camera audio recordings are not used to develop or improve Google’s own products and services.

b. Does Google use this or other audio data to develop biometric identifiers, such as “voiceprints”? If so, please describe any purposes for which Google uses these identifiers other than to enable personalized controls for Google Assistant.

A Google Nest or Assistant device user can choose to use certain optional features with Google’s connected home devices that involve face or voice detection:

1. Users can choose to use Voice Match or Face Match to personalize their Assistant experience (for more information on Voice Match, see <https://support.google.com/googlenest/answer/7342711>; for more information on Face Match, see <https://support.google.com/googlenest/answer/9320885?hl=en>). As noted above, Voice Match is a feature through which users can teach the Google Assistant to recognize their voice in order to use voice commands to get personalized results with smart home devices such as speakers, Smart Displays, or Smart Clocks.
2. Users can choose to use Familiar Face Alerts with Nest Camera and doorbells (for more information, please see <https://support.google.com/googlenest/answer/9268625>).

These specific features are enabled after express transparency and with clear user choice.

c. Does Google produce or use transcripts of audio data for any purpose? If so, what are they? Does Google use these transcripts for purposes other than personalized advertising?

Consistent with our commitments to users in our privacy policy, we produce and use transcripts of audio data from user interactions with Google Assistant for the following

purposes (for additional information as to our collection and use of data, please see our response to Sen. Blumenthal's Question No. 1):

1. To understand and answer questions posed by users to the Assistant, in order to provide the service requested by the user (for more information on how this works, please see <https://developers.google.com/assistant/howassistantworks/responses>);
2. Subject to a user's choices, settings, and preferences (such as whether they have chosen to save their Web & App Activity in their Google Account, and whether they are interacting with the Assistant in Guest Mode, as described below), to personalize the user's experience on Google Assistant and across Google services (for more information on personalized experiences, please see <https://safety.google/assistant/#assistant-easy-privacy-controls> "How does Google Assistant use data to personalize my experience?"). Such personalization can also include personalized ads, subject to the user's Google ads personalization settings; and
3. To improve our services and ensure they are working as intended, and for the other purposes described in our privacy policy (for more information, please see <https://policies.google.com/privacy?hl=en-US#whycollect>). Improving our services includes creating and using audio transcriptions as part of Google's audio review process, which uses saved audio recordings to develop and improve Google's audio recognition technologies (the saving of these audio recordings, as described above, is subject to explicit user opt-in.) During the audio review process, trained reviewers may listen to, transcribe, and annotate saved audio samples, to evaluate how well our technologies interpret the audio, for example, when someone is talking in a noisy environment or in a particular language. Google takes steps to protect users' privacy as part of this audio review process, including disassociating audio from a user's account when reviewers analyze or transcribe it. Transcribed or annotated audio is then used as training data to develop and improve Google's audio recognition technologies, like automated speech recognition. For example, Google improved automatic speech recognition for data-scarce languages by training a single model on audio from data-rich languages, which allowed for real-time multilingual speech recognition.

We believe that products should keep users' information only for as long as users find it useful and helpful to them. That is why last year, we decided to change our data retention practices for Web & App Activity, and make auto-delete the default for all our core services, including Google Assistant. For new users, that means that by default, their Assistant activity will be automatically and continuously deleted after 18 months. Users can also choose to customize their data storage settings to better fit their preferences.

Users can also delete their activity data and manage their activity settings at any time. Users can even ask the Assistant to perform certain privacy-related actions, like “Delete what I just said” or “That wasn’t for you” and the most recent Assistant activity will be deleted. It’s as simple as saying, for example, “delete what I said this week.”

When users choose to delete activity manually or activity is deleted automatically based on their auto-delete setting, we immediately start the process of removing it from the product and our systems. First, we aim to immediately remove it from view and the data may no longer be used to personalize the user’s Google experience. We then begin a process designed to safely and completely delete the data from our storage systems. For more information, please see <https://support.google.com/accounts/answer/10549751#zippy=%2Chow-deletion-of-activity-works>.

We also recently rolled out Guest Mode, a new way Google Assistant can be used on home devices without having Assistant activity saved into a user’s account or used to personalize their experience (for more information, please see g.co/assistant/guestmode). People can activate this mode by simply saying, “Hey Google, turn on Guest Mode” to their smart speaker or Smart Display. While in Guest Mode, Google automatically deletes audio recordings and Google Assistant activity, like things users ask the Assistant, from the device owner’s account. Even if users’ audio recordings and Assistant activity on the device are normally saved to their Google Account, this does not happen in Guest Mode. If users ask the Assistant to interact with another app or service, like their music provider or another Google product, that app or service may still retain their activity history within that app.

We recognize that privacy is not a one-size-fits-all proposition. Different users want to make different choices about how much information they share and how it is used. That is why we give our users control over their data privacy. To that end, we are continually focused on building tools that enable people to make the privacy choices that are right for them and their families.

2. When Google obtains video or image data from a smart home device, whether that data was collected through the device’s sensors, transmitted from another device, or generated by the device, how does it use that data?

When Google obtains video or image data from Google’s smart home devices, the data is used to provide users features and services. Video footage collected from Google’s connected home devices is not used for Google’s advertising purposes (as clearly expressed in Google’s commitments available here: <https://safety.google/nest/>).

Images and video data from Google’s smart home device are used to provide users the following categories of features and services:

1. **Home monitoring services:** Users can choose to use their Nest Cams and Hello doorbells for home monitoring and other home security purposes. Audio recordings and video footage from users' Nest camera and Nest Hello video doorbell are used to provide the camera features and services users agree to receive, and Google does not use this data for promotions or ad personalization. To review and delete their video history or their individual saved clips, users can follow the instructions available at <https://nest.com/support/article/Can-I-delete-my-Nest-Cam-Video-History>.
2. **General features and integrations:** Users can use first and third party apps and services with their connected home devices which might entail usage of video or images to provide the service, subject to the user's express permissions and settings. For example, users can choose to make or receive video calls using their Google connected home devices through Google services such as using Google Duo or third-party services such as Zoom. For more information on how to make calls on speakers and displays and making video calls, please see https://support.google.com/googlenest/answer/9905737?hl=en&ref_topic=9854800.
3. **Personalized device experiences:** Users can use a feature we call "Face Match" with Google's camera-enabled smart-display devices to personalize their home experience using their face. Face Match provides a proactive experience, such that when your device recognizes your face, it can proactively show you your personalized content. This includes things like video messages, reminders, and upcoming calendar events. When you approach your device for the first time each day, you can also choose to view things like the weather, your morning commute, suggestions of music to listen to, and top news headlines of the day. Face Match protects user privacy by implementing strict privacy safeguards. Face Match is off by default, and the user must expressly turn it on, after receiving clear and just-in-time notices about how their data will be processed. The user remains in control at all times and can opt-out and delete their face data at any time. On-device processing provides a further layer of safeguards. The face model is encrypted and stored on the device; following the setup process, all the face matching occurs locally on-device. That means that after setup, Face Match does not send video or images to Google servers.

a. Does Google use this or other video or image data to develop, test, or train biometric identification or object recognition systems other than the system that powers Google's Familiar Face Alert feature?

Images and video data collected via Google's smart-display devices or Nest Cams are not used to develop, test, or train biometric identification or object recognition systems.

Details about Google's Familiar Faces Alerts feature are provided in the response to the next question below.

i. Is the system that powers the Familiar Face Alert feature capable of recognizing objects or physical attributes other than faces? If so, what are they?

Nest offers camera products as well as video doorbells. The details of these products are available here:

https://support.google.com/googlenest/topic/9360834?hl=en&ref_topic=9299925.

All customers of Nest camera products can opt-in to receive intelligent alerts when their camera detects sound, motion, or a person. Our newest cameras can also detect animals. Customers can also view snapshots associated with these events for the preceding three hour period in their app. More information about these features is available at

<https://support.google.com/googlenest/answer/9208447?hl=en> and <https://support.google.com/googlenest/answer/9226382?hl=en>.

In addition to the features described above that are available to all Nest camera users, users can also choose to purchase a subscription service called “Nest Aware” to work alongside their Nest camera or Nest Hello doorbell. Using the Nest Aware service, users can choose to continuously record and store camera footage captured by their doorbell for up to 30 days. Nest Aware also includes various other intelligent camera features, such as the ability to opt-in to additional intelligent alerts (for example, for package detection) and a familiar faces detection feature (explained in more detail below). More information about Nest Aware is available at:

https://support.google.com/googlenest/answer/9248438?hl=en&ref_topic=9360528 and <https://support.google.com/googlenest/answer/9242083>.

Importantly, the following privacy protections are put in place for all Nest camera devices (regardless of whether the user is subscribed to the Nest Aware service):

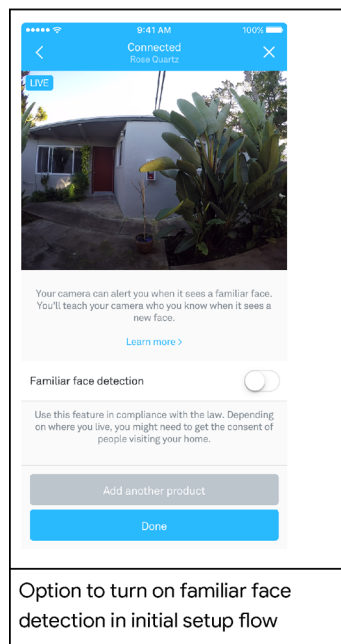
- Google does not store or otherwise process any camera footage unless the user expressly chooses to set up the Nest camera device and pair their device to their account in the app.
- Google puts the user in control, and provides them the ability to access, review, and delete any stored camera footage and associated data at any time.
- The user can turn the camera on and off, and can schedule particular times when the camera is activated and processing footage.
- While Google processes the camera footage for the user’s benefit and on their behalf, we do not use any of the camera footage for our own advertising purposes, but to provide the camera features and services the user requests. Specifically, the camera

footage is not used to develop or improve our own algorithms, nor for product improvements, promotions, or advertising purposes.

- We do not store or otherwise process any facial recognition data unless the user subscribes to Nest Aware and expressly opts-in to use the “familiar face detection” feature.

Familiar Face Detection feature:

“Familiar face detection” is a feature Google makes available in certain jurisdictions, as part of the Nest Aware subscription service, to allow users to get intelligent alerts when the camera detects familiar faces the user has added to her in-app faces library using the Nest camera product. A relevant screenshot of the onboarding flow of this feature is added below:



Option to turn on familiar face detection in initial setup flow

If the user chooses not to turn on familiar face detection during setup, they can turn it on later from their in-app device settings. Google offers this feature to empower the user to take control of their privacy and security, and feel a sense of safety inside their home.

The familiar face alerts feature detects faces and not other physical attributes of the user.

b. If a customer requests the deletion of video data collected by way of a Google smart home device or system, does Google also delete any data product or model derived from that data, such as a faceprint or other biometric attribute profile?

For Nest camera products, deleting your video history does not automatically delete the user's familiar faces library. But the user can choose to easily delete their faces library via the app at any time.

For Face Match feature on smart-display devices, if the user turns the feature off, the user's face model on the device is also deleted.

3. Has Google ever provided audio or video recordings or transcripts of audio recordings collected from smart home systems or devices to law enforcement?

i. If so, was this to comply with a court order?

ii. If Google has ever provided law enforcement access to audio recordings or transcripts without a court order, what policy, if any, describes the circumstances under which Google provides such access?

We have a robust law enforcement response process with analysts and lawyers dedicated to ensuring that we appropriately respond to legal processes from law enforcement and make referrals to law enforcement when we identify problematic or illegal activity on our platform. A law enforcement agency may ask Google to preserve specific information while the agency applies for legal process to compel the disclosure of that information. We have a dedicated team that responds to law enforcement around the clock, every day of the year, and we respond to such requests in accordance with applicable law. Legal requests related to ongoing investigations are often subject to non-disclosure or other confidentiality requirements. As such, we are generally unable to comment further on specific matters.

We describe our work and protocols concerning cooperation with law enforcement in our policies (available at <https://policies.google.com/terms/information-requests>) and our publicly available Transparency Reports (available at <https://transparencyreport.google.com/>).

Sale of Collected Data

1. Please describe Google's policies and procedures for selling, granting access, or otherwise making available any location, image, video, audio, or other data that Google or any other Alphabet company obtains by way of a smart home device to third parties or other Alphabet companies, including any restrictions on the types of data sold,

accessed, or made available, restrictions on eligible purchasers/receivers of the data, efforts to anonymize or aggregate the data, and any related notices to users.

2. If Google does not sell, grant access, or otherwise make available data obtained by way of smart home devices, please describe the circumstances in which Google sells, grants access, or otherwise makes available to third parties or other Alphabet companies any data or data products *derived* from smart home data, as well as any policies and procedures relevant to that sale or access.

Because the answers to these questions are related, we have grouped together our response to Question Nos. 1 and 2.

Google does not sell our users' personal information to anyone. That is not our business model, and we have always made this a touchstone of Google's relationship with our users.

Google's [Privacy Policy](https://policies.google.com/privacy) (available at <https://policies.google.com/privacy>) applies to our connected home devices and services (list available at <https://support.google.com/googlenest/?p=connected-devices>) and explains what information we collect; why we collect it; how and why we share information; and how you can update, manage, export, and delete your information. In addition, we've made specific privacy and security commitments with respect to data collected from our connected home devices and services (available here: <https://safety.google/nest/>), which explain how we limit usage of audio, video, and home environment sensor readings collected from our smart-home devices for Google's advertising purposes. For example:

"For all our [connected home devices and services](#), we will keep your video footage, audio recordings, and home environment sensor readings separate from advertising, and we won't use this data for ad personalization. When you interact with your Assistant, we may use those interactions to inform your interests for ad personalization. For example, if you ask, "Hey Google, what's the weather in Hawaii in July?" we may use the text of that voice interaction (but not the audio recording itself) to show you personalized ads. You can always review your Google settings to [control the ads you see](#), including opting out of ad personalization completely. Learn more about the Google Assistant and the choices available to you [here](#)."

At Google, our products use data from your Google connected home devices and services to make them more helpful to you. This means providing Google services and experiences related to the connected home, improving and personalizing them and developing new ones, helping to maintain safety and security across Google services, and keeping you informed of relevant Google products, services, and updates.

With respect to sharing users information obtained from Google's connected home devices and services:

1. We never sell our users' personal information to anyone.
2. Consistent with the Google Privacy Policy (available at <https://policies.google.com/privacy>), we may share users' personal information collected from our connected home devices with third parties to provide features, services and integrations users have requested, and with user transparency, choice, and control. For example, users choose to use various apps and services with their smart-home devices (such as making a video call via Zoom on a Google smart-display or playing music via Spotify on a Google speaker). If the user chooses to use a video or calling service such as Zoom, with the user's permission, their voice or video is shared with the third-party service. In addition, to play music on a service like Spotify, the user may say "Play Madonna on Spotify," in which case Google will convey the request to Spotify to play music of a particular artist. In all such cases, Google is sharing users information to meet the user intent to enable the feature. Other sharing instances include a user choosing to share their Nest Cam video footage with a home security service provider, or sharing their thermostat data with an energy services provider to save energy such as through the Seasonal Savings program.

For more information on connected home data collection and use, please see <https://support.google.com/googlenest/topic/7173611?hl=en>.

Finally, as explained in our Privacy Policy (available at <https://policies.google.com/privacy?hl=en-US#footnote-deliver-services>), we may share non-personally identifiable information with our partners so they better understand how their services are being used on Assistant.

The Honorable Marsha Blackburn (R-TN)

1. What is Google's largest source of profit? How much income does Google produce in that business?

Our quarterly and yearly operating income numbers for all our business units are detailed in our public filings, available at <https://abc.xyz/investor/>. In the year ending December 31, 2020, Google Services operating income totaled \$54.6B, which was our most profitable business.

2. Google produces smart, multi-room speakers, comparable in some respects to those of Sonos. Often, Google's product appears to be cheaper, how much money does Google make selling smart speakers?

Google Nest smart speakers are among a range of smart, multi-room speaker products sold by companies including Apple, Amazon, Harman Kardon/JBL, Sonos, Lenovo, and more. The smart home field is competitive and rapidly expanding, and we continue to face competition from around the globe, including offerings from Chinese companies like Alibaba, Baidu, and Xiaomi. This space is characterized by a large number of players, innovation, and significant user choice. Our hardware prices reflect this intensely competitive landscape. As a general matter, our devices and services products earn revenue from sources reflecting a range of business models, including subscriptions, partnerships with first- and third-party service providers, and standalone device sales.

3. How much does it cost Google to produce a smart speaker and much does an individual smart speaker sell for?

The current price of Google Nest smart speakers is available on the Google Store at https://store.google.com/us/product/nest_audio. This pricing is driven by the intense competition we face from other companies, and ranges widely by retailer, region, and promotional period.

On cost, we rely on many resources, including personnel and infrastructure, to develop our Nest smart speakers and the digital services used or provided by those speakers (e.g., Google Assistant). The work required to develop and manufacture our devices and services includes research and development for hardware and software, marketing, work with third-party manufacturers and suppliers, and a variety of other tasks. Our resources are deployed across our devices and services portfolio rather than being assigned to a specific device or service.

4. Google is suspected of predatory pricing enabled by cross-subsidizing their speaker business. Has Google ever sold its speakers below cost, and how often does this occur?

As noted above, Google Nest smart speakers are among a range of smart, multi-room speaker products sold by companies including Apple, Amazon, Harman Kardon/JBL, Sonos, Lenovo, and more. The smart home sector is rapidly expanding, and we continue to face stiff competition from around the globe. Our hardware prices reflect this intensely competitive landscape, and, as noted above, prices range widely by retailer, region, and promotional period.

5. The primary purpose of a speaker is sound, therefore a speaker's most important attribute must be sound quality. Would you consider the sound quality of your company's speakers to be generally lower, higher, or the same as comparable speakers produced by Sonos?

Our high-quality speakers allow users to stream their favorite music from services like Spotify, Pandora, SiriusXM, and others. We constantly innovate and improve the quality of our speakers due to evolving technologies and user expectations in the smart speaker realm and the competition we face.

Consumers have many choices when it comes to speakers, including smart speakers with features like those in the Google Nest products. We believe individual consumers decide which product to buy based on the particular features they most value.

6. Google harvests and controls an immense amount of data from its search engine users, and users of its other products. Smart home devices and their associated home ecosystems create another source of massive data collection. Google's largest business is advertising. How does Google use voice and word recognition to collect advertising data? Is it similar to data collection from input into Google's search engine?

Google has publicly committed to strict limitations on how data collected from its smart-home devices is used for Google's own advertising purposes. Specifically, Google has made the following public commitment available at <https://safety.google/nest/>:

"For all our [connected home devices and services](#), we will keep your video footage, audio recordings, and home environment sensor readings separate from advertising, and we won't use this data for ad personalization. When you interact with your Assistant, we may use those interactions to inform your interests for ad personalization. For example, if you ask, "Hey Google, what's the weather in Hawaii in July?" we may use the text of that voice interaction (but not the audio recording itself) to show you personalized ads. You can always review your Google settings to [control the ads you see](#), including opting out of ad personalization completely. Learn more about the Google Assistant and the choices available to you [here](#)."

As is clear from our public commitment, we have imposed several strict limitations on what smart-home data can inform Google ads. With respect to Google Assistant queries, when it comes to ads, we treat interactions with the Google Assistant similarly to searches, so if a user interacts with the Assistant using a Google connected home device, we may use those interactions to deliver more useful ads. For example, if a user asks, "Hey Google, what's the weather today?" we may use the text of that voice interaction (but not the audio recording itself) to show ads. Users can always review their Google settings to control the ads they see. However, other audio recordings collected from Google's connected home devices (such as audio associated with your Nest Cam footage) are not used to inform Google ads at all. Additional detail concerning Google's commitment to privacy in the home may be found at <https://safety.google/nest/>.

7. Google would know what kinds of smart appliances are in a user's home through the shared AI assistant network. How does that kind of data inform what advertising Google delivers to its customers?

We want people to understand how their data is used, make the choices that are right for them, and be assured their data is safe. We work to create a more helpful home, continuing to build devices and services that allow the user's home to take care of the people inside it and the world around it. And in doing so, we live by the same core privacy and security principles that guide all of our work (for more information, please see <https://safety.google/principles/>).

As explained in the Google Privacy Policy, if you use a Google Account, Google may use information you provide, including basic information about the type of devices in your home, to show you relevant ads. Users can always learn more information concerning personalized advertising and controlling the ads they see on Google's support pages (see <https://support.google.com/google-ads/answer/2549116?hl=en> and <https://support.google.com/accounts/answer/2662856>). In addition, users can turn off ad personalization in their Google Account settings, found here: <https://adssettings.google.com/>.

8. To create user preference for a certain products, Google is incentivized to limit interoperability for devices outside of their respective smart home ecosystems centered around their AI assistants. Sonos has said their speakers have the ability for users to use any partnered AI assistant and switch between them by voice without needing to change software settings or preferences. Amazon is apparently supportive of this idea. Why has google opposed this ability on partnered devices?

Google supports several efforts to improve interoperability with other providers—whether third-party device makers, other assistants, web services, or apps. Part of why the smart home sector is exciting is that the field involves nascent, highly innovative products and services with ever-emerging form-factors and use cases, and lots of user choices. On Android devices, for example, it is easy for users to set up rival voice assistants, like Alexa, to work with connected devices. A user might have Alexa in the car, a Google Nest in the kitchen, and Siri on a smart watch. In fact, Android consumers have downloaded the Alexa app more than 50 million times from Google Play, and the Qualcomm Voice Assistant app has been downloaded from Google Play more than 10 million times.

The question of whether to allow multiple assistants to have simultaneously active hotwords on a given device type raises user experience considerations, privacy and security concerns, and technical challenges in this nascent space. We are striving for more interoperability consistent with our security and privacy commitments, while maintaining an excellent user experience. This includes striking the right balance between giving users choice and protecting their data, and also avoiding confusion on our services.

Many products currently being sold allow users to choose whether to control them using Google Assistant or Alexa, including Philips Hue smart lights, Carro smart ceiling fans, and Whirlpool smart dishwashers, as well as speakers from Bose, TVs from LG and Samsung, and headphones from many brands. Samsung phones support both Bixby and Google Assistant.

We regularly work with device manufacturers to develop interoperable solutions. We recently announced interoperability between Samsung's SmartThings and Google Assistant. We are also supporting industry-wide standards and protocols to ensure consumers can use multiple devices. A primary example of this is Google's participation (with other leading tech companies) in the development of Matter, a new protocol that simplifies smart homes by using one standard across the industry (for more information, please see <https://buildwithmatter.com/>). Google is committed to supporting Matter, and to enhancing interoperability and choice for smart home consumers. We see the new Matter standard under development by the Connectivity Standards Alliance as a positive step forward for the industry (for more information on this initiative, please see <https://csa-iot.org/>). Along with over 180 member companies, we are working together to build technologies that simplify product development and increase choice for consumers. Given input and commitments from such a broad coalition of industry players, we hope these technologies will be broadly adopted.

Any company can utilize Matter's standard in its devices, and as a sign of our commitment to interoperability, Google is invested in integrating Matter as a feature across a range of our products. We have announced plans to update our Google Nest Displays, Speakers, and Wifi devices with Matter to enable them to operate other devices that utilize Matter's unified protocol - regardless of which company markets those devices. We will also provide an easy way for users to onboard Matter devices through Google Play services on Android and the Google Home App, and will update our latest Nest Thermostat to be Matter-compliant so that the user can choose to control it with their preferred smart home systems.

Google aims to enable Matter on our Google Nest Displays, Speakers, and Wifi devices and Android shortly after the 1.0 specification is ratified and the open-source reference implementation is complete. As the Matter specification continues to evolve, we will look to expand Matter compatibility to even more of our devices.

9. Google collects massive amounts of data through their AI assistants on their smart home devices and partnered products. Much of this data is valuable for selling advertising, general market information, or feedback used to improve products. Recently, Google has been accused by smaller firms who do business with them of using certain privacy rules and regulations as pretext for anticompetitive behavior. These critics often describe the relationship as one-sided with one party monopolizing data that was created through the business partnership. Does Google believe it has the

exclusive right to data collected through its voice activated AI assistant even if it was collected through a partnered company's product?

Google's collection and use of the data received through provision of our services are governed by 1) Google's contractual agreements with third-party developers, and/or 2) Google's privacy commitments to users (including users of our software - e.g., Google Assistant - on a third-party developer's device).

Google has written policies, created storage and access systems, and designed other processes specifically to restrict our access to third-party data. These policies, systems, and processes have been designed according to commitments we have made to third-party developers, including partnership agreements (the terms of which are often subject to confidentiality obligations). In general, when a third-party developer enables interactions with Google Assistant, the Actions on Google terms of service govern the relationship (for more information, please see <https://developers.google.com/assistant/console/policies/terms-of-service> and <https://developers.google.com/assistant/howassistantworks/developers>). Such third-party developers can receive analytics information about their Actions from Google through the Actions on Google analytics console (<https://developers.google.com/assistant/console/analytics>).

Developers can choose to share certain data with Google to fulfill user requests and enable their integrations with Assistant, including:

- Information for linking to user accounts, so that users can use Assistant to interact with their accounts for third-party features like Actions, media, smart home and productivity services.
- Content and data libraries, to help Assistant fulfill user requests through the developer's service. For example, some media providers allow Google to index their media catalog so that users can play content through Assistant. Providers can also share media playlists of users who have linked their accounts, so that those users can ask Assistant to play their playlists.
- Actions on Google developers share data with Google to enable interactions with their users. For example, developers can specify what data is stored in a per-user or per-household data store, which can be reset by the user, so that their Action can remember the user in subsequent interactions. Developers also provide fulfillment responses to answer user requests.
- Third-party devices where Assistant is built-in, such as speakers and TVs, share users' Assistant queries and related data with Google, so that users can use Assistant through that device.

In addition, Google's Privacy Policy (available at <https://policies.google.com/privacy>) applies to our connected home devices and services and explains what information we collect; why we collect it; how and why we share information; and how users can update, manage, export, and delete their information. In addition, we've made specific privacy and security commitments with respect to data collected from our connected home devices and services (available at <https://safety.google/nest/>), which explain how we limit usage of audio, video, and home environment sensor readings collected from our smart-home devices for Google's advertising purposes.

As with many of our services, interaction between Google Assistant and a smart device inherently necessitates the exchange of some data, and we've crafted our privacy disclosures and policy explanations to provide our users with transparency, choice, and control over their data. For example, operating a smart speaker via Google Assistant requires the speaker to send the recording of a voice command to Google, which then interprets the command, translates it into structure command, and sends it back to the speaker for execution. Users have a number of tools available to them to allow them to control the collection, storage and use of their data by Google. For example, signed-in users can manually delete any activity data associated with their Google Account (<https://myaccount.google.com/data-and-personalization>), set up automatic deletion so that the activity data is deleted after a specified time period, or turn off Web & App Activity so that activity data is not saved to the user's account. Users can view their Google Assistant activity by visiting "Your data in the Assistant" through the Google Assistant app or Google Assistant Activity, which is accessible through Google Home and Google Assistant apps and online (for more information, please see <https://myaccount.google.com/yourdata/assistant?pli=1>). Ultimately, users have control over their data and have the ability to delete activity data at any time.

Users can also choose to link their accounts with various other third-party services and apps to Google Assistant and then use Google Assistant to interact with those services and apps. In order to understand and fulfill a user's Google Assistant queries that relate to those services and apps, Google uses information that the third party makes available as a result of the account linking. For example, Google uses information about a user's playlists in a third-party media service so that it can play those playlists if the user asks it to do so. The user agrees to this data sharing as part of the account linking flow.

Uses of the data that users share include:

- **Providing the Google Assistant service:** Google uses user data to deliver its services. This data is not aggregated or anonymized for this purpose, as delivery of services to the user is specific to the user request. Examples of how Google uses data collected via Google Assistant for the purposes of providing Google Assistant include:

- Google uses the voice commands that a user provides to Google Assistant to fulfill the user's request, such as turning smart lights on or off;
- Google uses IP addresses assigned to a user's device to send the user the data it has requested, such as loading a YouTube video; and
- Google uses user app preference data to access their preferred services on request (for example, accessing music on Spotify).
- **Maintaining and Improving Google services:** Google uses user data to ensure its services are working as intended, such as tracking outages or troubleshooting issues reported by users. User data can also be used to make improvements to Google Assistant. For example, where a user has chosen to save their audio data, Google can use audio recordings to develop and improve its speech recognition technology. This helps to reduce the number of mistaken activations of Google Assistant where the user did not intend to interact with Google Assistant, and improves the accuracy of Google Assistant's understanding of user audio data. Google does not save audio recordings and use them to improve speech recognition by default; the user must elect to save their audio data.
- **Providing relevant services, including content and ads:** Google uses the data it collects to provide users with relevant recommendations and search results. For example, depending on a user's settings, Google may be aware of the user's location; if a user searches for "mountain bike stores," Google can then provide information about stores local to the user.
- **Communicating with our users:** Google uses data collected from users, such as their email address, to interact with them directly. For example, Google may let users know about upcoming changes or improvements to Google Assistant.
- **Protecting users and the public:** Google uses user data to help improve the safety and reliability of Google Assistant. This includes detecting, preventing, and responding to fraud, abuse, security risks, and technical issues that could harm Google, Google Assistant users, or the public. For example, Google may notify users in the event suspicious activity is detected on their Google Account, like an attempt to sign in to Google Assistant from an unusual location.

The Honorable Josh Hawley (R-MO)

1. For each of the following dates, please provide a list of Google Nest or Home smart speaker models, or any comparable or predecessor Google-branded smart speaker products, on the market at that point, along with the cost of production of an

individual unit of each model as of that date. Do not include costs associated with shipping the device to end users.

1. January 1, 2019
 2. April 1, 2019
 3. July 1, 2019
 4. October 1, 2019
 5. January 1, 2020
 6. April 1, 2020
 7. July 1, 2020
 8. October 1, 2020
 9. January 1, 2021
 10. April 1, 2021
 11. June 22, 2021
2. For each of the following dates, please provide the consumer list price of each Google Nest or Home smart speaker model on the market at that point. Do not include charges for shipping the device to end users.
1. January 1, 2019
 2. April 1, 2019
 3. July 1, 2019
 4. October 1, 2019
 5. January 1, 2020
 6. April 1, 2020
 7. July 1, 2020
 8. October 1, 2020
 9. January 1, 2021
 10. April 1, 2021
 11. June 22, 2021
3. Please indicate whether, at any times between January 1, 2019 and June 22, 2021, any Google Nest or Home smart speaker models were placed on sale by Google, and if so, for how long and what list price was charged to consumers at each relevant point.

Because the answers to these questions are related, we have grouped together our responses to Question Nos. 1, and 2, and 3.

The current price of Google Nest smart speakers is available on the Google Store at https://store.google.com/us/product/nest_audio. Google Nest smart speakers are among a range of smart, multi-room speaker products sold by companies including Apple, Amazon, Harman Kardon/JBL, Sonos, Lenovo, and more. The smart home field is competitive and rapidly expanding, and we face competition from around the globe, including offerings from Chinese companies like Alibaba, Baidu, and Xiaomi. This space is characterized by a large number of players, innovation, and significant user choice. Our hardware prices have always reflected this intensely competitive landscape, and range widely by retailer, region, and

promotional period. In the chart below, we have provided the manufacturer's suggested retail pricing for a number of the products for the quarters covering the requested dates. However, the specific prices offered at or around these times may have varied from those listed below based on factors such as retailer, region, and promotional period.

Speakers	Q1'19	Q2'19	Q3'19	Q4'19	Q1'20	Q2'20	Q3'20	Q4'20	Q1'21	Q2'21
Home	\$129.00	\$99.00	\$99.00	\$99.00	\$99.00	\$99.00	\$99.00	\$99.00		
Home Max	\$399.00	\$299.00	\$299.00	\$299.00	\$299.00	\$299.00	\$299.00	\$299.00	\$299.00	\$299.00
Home Mini	\$49.00	\$49.00	\$49.00	\$49.00	\$49.00	\$49.00	\$49.00	\$49.00	\$49.00	\$49.00
Nest Mini				\$49.00	\$49.00	\$49.00	\$49.00	\$49.00	\$49.00	\$49.00
Nest Audio								\$99.99	\$99.99	\$99.99

On cost, we rely on many resources, including personnel and infrastructure, to develop our Nest smart speakers and the digital services used or provided by those speakers (e.g., Google Assistant). The work required to develop and manufacture our devices and services includes research and development for hardware and software, marketing, work with third-party manufacturers and suppliers, and a variety of other tasks. Our resources and costs are deployed across our device and service portfolio rather than being assigned to a specific device or service.

4. Does Google provide unified access to competitor digital services through its smart home products? If so, which specific competitor digital services do Google's smart home products support?

5. For each of the aforementioned competitor services, please state whether those services—to the extent they offer features comparable to those of Google's own services being offered in the same markets—currently have levels of functionality equal to those of Google's own services, when running on Google's smart home products.

Because the answers to these questions are related, we have grouped together our response to Question Nos. 4 and 5.

Google supports several efforts to improve interoperability with other providers—whether third-party device makers, other assistants, web services, or apps. Part of why the smart home sector is exciting is that the field involves nascent, highly innovative products and services with ever-emerging form-factors and use cases, and lots of user choices. On Android devices, for example, it is easy for users to set up rival voice assistants, like Alexa, to work with connected devices. A user might have Alexa in the car, a Google Nest in the Kitchen, and Siri on a smart watch. In fact, Android consumers have downloaded the Alexa app more than 50 million times from Google Play, and the Qualcomm Voice Assistant app has been downloaded from Google Play more than 10 million times.

Here are a few other examples of how we currently support interoperability:

- Thousands of applications are already compatible with Android Auto, and our goal is to allow even more developers to make their apps available over time. Android Auto supports rival apps such as Sygic GPS Navigation and TomTom AmiGo, which are Google Maps rivals. As one third-party recently noted “[b]y opening up Android Auto for third-party developers, Google essentially allowed software makers to release alternatives even to its own apps, including Google Maps[.]”
- On Fitbit devices, depending on the model, a user can choose to use Amazon Alexa or the Google Assistant.
- Android device makers can easily include apps for their wearable devices and services, or those of their rivals. Apps for competing wearable devices and services can also be distributed through Google Play, or competing Android app stores like Samsung Galaxy Store.
- We support rival media services like Spotify, Pandora, Apple Music and Netflix through integrations with Google Assistant and our Google Nest hardware. We also support Zoom video calling—a direct competitor to Google Meet—on Nest Hub Max smart displays.

To make third-party applications interoperable on a variety of devices, we have developed our “Actions on Google” platform (see <https://developers.google.com/assistant>). It allows developers to easily deliver their content to users without having to build countless original equipment manufacturer (“OEM”) and device-specific solutions. Developers incur lower costs because they do not have to develop different apps and users benefit from the sheer endless choice of apps available. In fact, there are over one million Actions on Google available now. In addition, millions of Android app developers can make App Actions for users to launch and control their apps using Google Assistant (see <https://developers.google.com/assistant/app/overview>).

Google and other leading tech companies are also working together to develop Matter, a new open source protocol that simplifies smart homes by using one standard across the industry (for more information, please see <https://buildwithmatter.com/>). Google is committed to supporting Matter, and to improving interoperability and choice for smart home consumers. We see the new Matter standard under development by the Connectivity Standards Alliance as a positive step forward for the industry (for more information about this alliance, please see <https://csa-iot.org/>). Along with over 180 member companies, we are working together to build technologies that simplify product development and increase choice for consumers. Given input and commitments from such a broad coalition of industry players, we hope these technologies will be broadly adopted.

Any company can utilize Matter’s standard in its devices, and as a sign of our commitment to interoperability, Google is invested in integrating Matter as a feature across many of our

products. We have announced plans to update our Google Nest Displays, Speakers, and Wifi devices with Matter to enable them to operate other devices that utilize Matter's unified protocol - regardless of which company markets those devices. We will also provide an easy way for users to on-board Matter devices through Google Play services on Android and the Google Home App, and will update our latest Nest Thermostat to be Matter-compliant so that the user can choose to control it with their preferred smart home systems.

Google aims to enable Matter on our Google Nest Displays, Speakers, and Wifi devices and Android shortly after the 1.0 specification is ratified and the open-source reference implementation is complete. As the Matter specification continues to evolve, we will look to expand Matter compatibility to even more of our devices.

The Honorable Richard Blumenthal (D-CT)

1. At the Antitrust Subcommittee's App Store hearing, you testified that it was your understanding that Google has "data access controls in place that govern how data from our third-party services are used." At the Subcommittee's Internet of Things hearing, I asked you whether Google has a firewall between its Internet of Things platforms and its product development teams. You stated that Google has "data access and controls in place" and "internal policies in place that govern how [it] use[s] data." You further stated that you could not say whether there was an impenetrable firewall that prevents any exchange of information, but that you could "get more specifics on that."

a. When does Google share data collected from third-party software developers with Google's own product developers? What data is shared? What limitations are placed on the use of the data for competitive purposes?

b. When does Google share data collected from third-party software developers with Google employees other than its own product developers? What data is shared? What limitations are placed on the use of the data for competitive purposes?

c. How does Google use data collected from third-party software developers to inform its own product development?

d. What are Google's policies on the use of data collected from third-party software developers?

e. Where are the Google's policies on the use of data collected from third-party software developers located?

f. Do third-party software developers have the ability to challenge or appeal Google's use of their data for its own competitive purposes?

Google's collection and use of data collected from third-party software developers through provision of our services are governed by 1) Google's contractual agreements with third-party developers, and/or 2) Google's privacy commitments to users (including users of our software - e.g., Google Assistant - on a third-party developer's device).

Google has written policies, created storage and access systems, and designed other processes specifically to restrict our access to third-party data. These policies, systems, and processes have been designed according to commitments we have made to third-party developers, including partnership agreements (the terms of which are often subject to confidentiality obligations). In general, when a third-party developer enables interactions with Google Assistant, the Actions on Google terms of service govern the relationship (for more information, please see <https://developers.google.com/assistant/console/policies/terms-of-service> and <https://developers.google.com/assistant/howassistantworks/developers>). Such third-party developers can receive analytics information about their Actions from Google through the Actions on Google analytics console (<https://developers.google.com/assistant/console/analytics>).

Developers can choose to share certain data with Google to fulfill user requests and enable their integrations with Assistant, including:

- Information for linking to user accounts, so that users can use Assistant to interact with their accounts for third-party features like Actions, media, smart home and productivity services.
- Content and data libraries, to help Assistant fulfill user requests through the developer's service. For example, some media providers allow Google to index their media catalog so that users can play content through Assistant. Providers can also share media playlists of users who have linked their accounts, so that those users can ask Assistant to play their playlists.
- Actions on Google developers share data with Google to enable interactions with their users. For example, developers can specify what data is stored in a per-user or per-household data store, which can be reset by the user, so that their Action can remember the user in subsequent interactions. Developers also provide fulfillment responses to answer user requests.
- Third-party devices where Assistant is built-in, such as speakers and TVs, share users' Assistant queries and related data with Google, so that users can use Assistant through that device.

Protecting Competition and Innovation in Home Technologies

**Hearing before the Senate Committee on the Judiciary, Subcommittee on Antitrust,
Competition Policy, and Consumer Rights**

June 15, 2021

QUESTIONS FROM SENATOR BLUMENTHAL

Questions for Professor Zittrain:

1. In your written testimony, you noted that “without trusted industry-wide buy in” on interoperability standards, “any new unifying standard risks becoming just yet another instrument in a cacophony.” What approaches—legislative or otherwise—do you recommend to achieve trusted industry-wide interoperability?

Regulators, including the Federal government, could establish standards for nondiscriminatory (but still secured and authorized) access to the basic control structures of smart devices. The proposed ACCESS Act is an example of an approach that could achieve this with major vendors of smart devices, including the structuring of trusted intermediaries to assist with private data management.

More broadly, some standards for the communication and control of smart devices would represent a public good the way that Internet-related protocols are public goods – developed outside of any one vendor (indeed, noncommercially), and available to all. There is no need to mandate that networked devices use Internet protocol because it’s such a well-established and useful standard. To become that required some fortuity and some hard work by people not operating under the usual conventions of dot-com competition. As it rightly does with other public goods, Congress could subsidize – with comparatively very little investment – the generation of and experimentation with such standards, possibly through National Science Foundation support for academic researchers who wish to engage in open development. Government procurement standards, could in turn promote the adoption of such devices: “buy American” could be complemented with “buy open.”

- a. If I have Internet of Things products in my home, like Amazon’s Alexa or Google’s Nest products, how would interoperability requirements help me as a consumer?

Interoperability requirements would help avoid consumer lock-in, which, as I described in my testimony, occurs when a necessarily cabined choice of phone or smart device snowballs into a permanent choice of a proprietary ecosystem over time. The ability to separate hardware devices from hardware hubs, and hardware from software, would allow consumers to control them through other vendors or other means. This would also help avoid a “monoculture” in

operations that could pose a systemic risk.

- b. How would interoperability requirements help nascent competitors build new Internet of Things devices?

Interoperability requirements or practices would allow nascent competitors to build devices without incurring the significant cost associated with building control interfaces or hubs. In much the same way that someone can write a program that uses the Internet or simply functions on a smartphone without having to reinvent networking protocols, increased interoperability would simplify the product development process, allowing competitors to focus on what is to be offered as the most innovative contribution.

Similarly, competitors could experiment with new ways to control or manage devices, including that link them among devices from multiple vendors, and offer those control systems as their innovative contribution.

2. In your written testimony, you write that “as someone who historically has not broken the glass and pulled the fire alarm for every possible concern about digital privacy over the past thirty years, the Internet of Things stands to become a privacy apocalypse.” You describe the ways in which microphones, cameras, and other sensors attached to Internet of Things devices can reveal detailed information about Americans’ daily lives.

- a. What tools should Congress consider to protect consumer privacy in the Internet of Things marketplace?

Congress should urgently intervene to require large platforms hosting massive amounts of public-facing personal data to take basic steps to secure that data against uses not contemplated by their users. For example, just as Facebook and Twitter rightly strip out geolocation data otherwise automatically embedded in the smartphone photos that their users post, they should perform basic tasks to safeguard user data against total-scale scraping and to render it less amenable to processing, such as through “adversarial perturbation” of photos to make them less susceptible to facial recognition or sorting algorithms without user consent. Smart devices that gather photos and other identifiable data could similarly work to protect against unexpected bulk uses.

The nature and types of telemetry conveyed by smart devices to their vendors should be required to be disclosed up front the way that food must have a nutrition label. Devices should be required to have a “faraday mode” that severs all telemetry while preserving functions that do not require a link to the vendor to work.

- b. You write that Internet of Things products “opens up entirely new avenues of government-mandated monitoring, and in the United States the ground rules for such surveillance are as yet poorly understood, since they were developed around

communications technologies, that is, devices put into use only when one person is trying to communicate with others, such as telephones.” Why does the Electronic Communications Privacy Act and other key surveillance laws not cover these devices? Should the Electronic Communications Privacy Act be updated to address Internet of Things technologies that might fall outside of the scope of “communications technologies” motivating the passage of that law in 1986, and if so, what changes do you recommend?

Congress should provide for a higher level of privacy protection for outside monitoring of devices that are not communications devices. The framework for monitoring traditional communications contains within it the idea that people communicating, when up to no good, is something that can facilitate crime – hence the idea of “conspiracy” as a separate substantive crime, and of accomplice liability. In the absence of these factors, the rights of people to simply exist in their homes or other places of repose without undue monitoring should be specifically secured. Previously, the effort required to surveil people in such circumstances was itself onerous enough to limit applications for surveillance. The Internet of Things inverts that, making monitoring through home web cams, televisions, or other devices potentially trivial. The law must respond.



June 22, 2021

Dear Members of the Subcommittee on Intellectual Property of the Senate Committee on the Judiciary,

We applaud you for convening today's hearing, and urge the Subcommittee to continue to prioritize patent quality—seeking to ensure only valid patents issue and protecting against the assertion of low-quality patents. Patent quality is essential to the nation's innovative startups, both because high-quality patents are valuable assets for many nascent tech companies and because low-quality patents are a barrier to innovation and too easily weaponized against small businesses. Today's conversation, on Protecting Real Innovations by Improving Patent Quality, promises to make a valuable contribution toward better, more quality-focused patent policy.

Engine is a non-profit technology policy, research, and advocacy organization that bridges the gap between policymakers and startups. Engine works with government and a community of thousands of high-technology, growth-oriented startups across the nation to support the development of technology entrepreneurship through economic research, policy analysis, and advocacy on local and national issues. We appreciate the opportunity to submit this letter to the record of today's hearing.

High-quality patents can be a valuable asset for many high-growth, high-tech startups. These companies understand the role patents can play in protecting inventions.¹ For many early stage companies, they seek high-quality patents to attract investors, obtain some competitive advantage, prevent direct copying, and enhance their reputation.² Likewise, increasing patent quality will increase confidence in the entire U.S. patent system.

By contrast, low-quality patents—those that claim things that were already known or that are written in vague, overbroad terms that are difficult to understand—lack value and routinely stand in the way of innovation. And they operate in ways that are particularly detrimental to startups. The mere existence of a low-quality patent can distort commercial and innovation markets, operating—as the Supreme Court has noted—like “scarecrows.”³ Even if they are never asserted, “invalid patents can create unacceptable litigation risks for potential entrants, raise entry costs, delay entry, deter

¹ See, e.g., *Patent Quality is Essential to the State of Innovation*, YouTube, (Nov. 9, 2018), https://www.youtube.com/watch?time_continue=1&v=63NYSYcV5kc.

² See, e.g., Stuart J.J. Graham et al., *High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey*, 24 Berkeley Tech. L.J. 1255, 1256 (2009) (reporting on survey of entrepreneurs); #StartupsEverywhere profile: Alex Kukulinski, Founder, Jyio, Engine (Apr. 24, 2020), <https://www.engine.is/news/startupseverywhere-lincoln-neb> (“While I had some hesitations up front about patent trolls and other concerns, I think when it comes to protecting what you're doing, I think it is nice to say we have some legal protections with the patents.”).

³ *Cardinal Chem. Co. v. Morton Int'l, Inc.*, 508 U.S. 83, 96 (1993) (quoting *Bresnick v. U.S. Vitamin Corp.*, 139 F.2d 239, 242 (2d Cir. 1943) (Hand, J)).

customers and business partners from contracting with new entrants, and impose inefficiencies while distorting innovation.”⁴

Yet, low-quality patents are a reality facing the nation’s innovators. And in recent years the country’s global rankings in quality have dropped.⁵ Indeed, one study revealed that 43 percent of patents that are subject to a final court judgment on validity were found invalid.⁶ Another study estimated approximately 28 percent of patents would be found anticipated or obvious (i.e., invalid under 35 U.S.C. §§ 102 or 103) if adjudicated. For patents covering software or business methods, those estimated invalidity rates increase to 39 percent and 56 percent respectively.⁷ And this is likely an underestimate, as the study only looked at prior-art-related invalidity and did not consider how many patents are likely invalid under, e.g., 35 U.S.C. § 112.

Regrettably, low-quality patents can be (and are) weaponized against startups and small businesses in ways that slow them down and have forced many to close up shop altogether.⁸ Startups are more vulnerable than established firms to the costs and risks of abusive patent litigation, making them an attractive and unfortunately common target.⁹ Indeed, many startups will only interact with the patent system in the context of abusive litigation. For example, patent assertion entities (PAEs) use low-quality patents to try to coerce startups to take quick settlements and established competitors can use even meritless patent litigation to distract, slow, or stall new market entrants.¹⁰ And low-quality patents are the type that can be easily asserted against, or used to threaten, a broad range of innovative companies and/or end-users of technology.¹¹

Low-quality patents also pose problems for patent owners. As noted, many startups opt to incur the expense of applying for and obtaining patents. It is frustrating for a company to learn that, after spending that time and money, its patent is easily invalidated; if the applicant knew about prior art or disclosure problems sooner, it could have amended its patent during examination, resulting in a higher-quality patent that truly passes statutory muster at the end. The answer to the quality problem cannot be to make low-quality patents (which, again, do not satisfy the statutory requirements,

⁴ Christopher R. Leslie, *The Anticompetitive Effects of Unenforced Invalid Patents*, 91 Minn. L. Rev. 101, 114 (2006).

⁵ E.g., Adam Houldsworth & Bridget Diakun, *Benchmarking 2020 – Europe Holds its Lead but Honeymoon Might be Over for USPTO Head*, IAM (June 8, 2020), <https://www.iam-media.com/law-policy/benchmarking-2020-europe-holds-its-lead-honeymoon-might-be-over-uspto-head> (U.S. ranks 4th out of 5 patent offices for quality).

⁶ John R. Allison et al., *Our Divided Patent System*, 82 U. Chi. L. Rev. 1073, 1099 (2015).

⁷ Shawn P. Miller, *Where’s the Innovation: An Analysis of the Quantity and Qualities of Anticipated and Obvious Patents*, 18 Va. J. L. & Tech. 1, 6-7 (2013).

⁸ See, e.g., Joe Mullin, *New Study Suggests Patent Trolls Really Are Killing Startups*, Ars Technica (June 11, 2014), <https://arstechnica.com/tech-policy/2014/06/new-study-suggests-patent-trolls-really-are-killing-startups/> (startup’s valuation dropped by \$4 million during a patent suit that was ultimately dismissed); Amy L. Landers, *The Antipatent: A Proposal for Startup Immunity*, 93 Neb. L. Rev. 950, 979-80 (2015) (recounting examples of two former startups who won patent cases but lost market opportunities); Engine, *Startups Need Comprehensive Patent Reform Now* 7-14, <https://perma.cc/8E7R-S46Q> (recounting additional stories of startups harmed by assertion of wrongly-issued patents).

⁹ E.g., Collen Chien, *Startups and Patent Trolls*, 17 Stan. Tech. L. Rev. 461, 461-62 (2014) (“most unique defendants to troll suits are small”); Ted Sichelman, *The Vonage Trilogy: A Case Study in “Patent Bullying”* 90 Notre Dame L. Rev. 543 (2014) (describing how “incumbents [are] able to exploit defects in the patent system in order to prevent disruptive technologies from competing with their outmoded products and services”).

¹⁰ E.g., *id.*

¹¹ Cf. Chien, *supra* note 9, at 478 (noting patent assertion entities assert in a way that creates more options for “widespread campaigns targeting small companies that have little to do with the underlying technology”).

should not have issued in the first place, and hurt innovation) more enforceable or harder to challenge. Instead, Congress is correct to turn its focus to improving the quality of issued patents.

The Subcommittee will likely hear promising suggestions today, and we hope you will also evaluate these options as you consider how to improve patent quality. First, build on the success of the America Invents Act in creating regional patent offices, to do an even better job of meeting innovators where they are at and ensuring they have ready access to the resources, tools, and advice they need to prepare and file high-quality applications. Second, consider pilots to provide more information about applications and related prior art early in examination.¹² Third, restore quality oriented infrastructure and leadership positions within the U.S. Patent and Trademark Office (PTO).¹³ Fourth, ensure the PTO and examiners have the resources and technology needed to fully evaluate patent quality (including relevant prior art and the time to analyze it).¹⁴ Fifth, identify and correct incentives for the issuance of low-quality patents, including evaluating possible improvements to the PTO's cost structure.¹⁵ Sixth, encourage earlier clarity during patent examination, perhaps through claim construction analysis.¹⁶ Finally, promoting quality must also include meaningful opportunities to challenge low-quality patents, because even with improvements to the system some will continue to issue. Increased patent quality on the front end can reduce demand for post-issuance challenges, but affordable and efficient opportunities to challenge invalid patents are still needed.

* * *

Thank you for your consideration. Engine appreciates the Subcommittee's demonstrated interest in improving patent quality, and remains committed to engaging with Members on these and other important issues.

Sincerely,
Engine

¹² E.g., Colleen V. Chien, *Rigorous Policy Pilots the USPTO Could Try*, 104 Iowa L. Rev. Online 1 (2019), available at <https://ssrn.com/abstract=3499202> (suggesting a pilot to give applicants all relevant prior art "up front"); *Improving Access and Inclusivity in the Patent System: Unleashing America's Economic Engine*, Hearing Before the Subcomm. on Intellectual Property of the S. Comm. on the Judiciary, 117th Congress at 1:01:38 (2021) (testimony of Professor Lateef Mima, Professor of Law, Howard University School of Law), available at <https://www.judiciary.senate.gov/meetings/improving-access-and-inclusivity-in-the-patent-system-unleashing-americas-economic-engine> (suggesting pre-prosecution patentability assessment for certain applicants).

¹³ See, e.g., Abby Rives, *A Declining Focus on Patent Quality at the USPTO and What it Means for Startups*, Engine (Oct. 21, 2020), <https://www.engine.is/news/ip-recap-102120>.

¹⁴ See, e.g., Josh Landau, *Granted in 19 Hours*, PatentProgress (Mar. 6, 2018), <https://www.patentprogress.org/2018/03/06/granted-19-hours/>.

¹⁵ E.g., *Promoting the Useful Arts: How Can Congress Prevent the Issuance of Poor Quality Patents?*, Hearing Before the Subcomm. on Intellectual Property of the S. Comm. on the Judiciary, 116th Congress (2019) (testimony of Melissa F. Wasserman), available at <https://www.judiciary.senate.gov/imo/media/doc/Wasserman%20Testimony.pdf>.

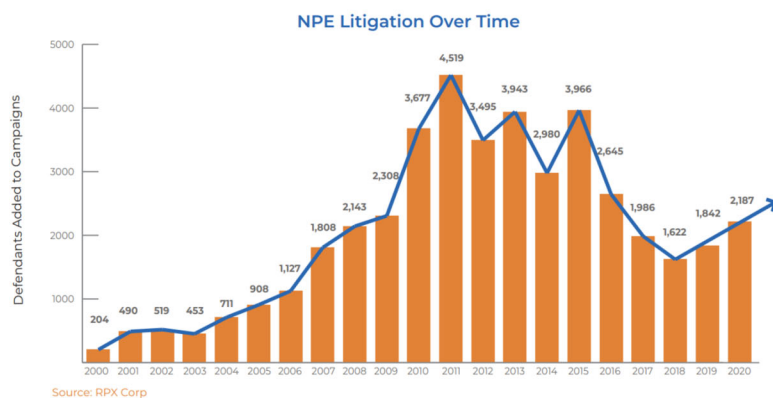
¹⁶ E.g., R. Polk Wagner, *Understanding Patent-Quality Mechanisms*, 157 U. Penn. L. Rev. 2135, 2165-68 (2009).

UNITED for PATENT REFORM

United for Patent Reform (UFPR) is a broad coalition of diverse American businesses advocating for a patent system that enhances patent quality, advances meaningful innovation, and protects legitimate American businesses from abusive patent litigation. Our members are small and large — they range from Main Street retail shops, REALTORS®, hotels, grocers, convenience stores, and restaurants to national construction companies, automobile manufacturers, and technology businesses. Collectively, our members represent over 80 million U.S. employees, a figure that accounts for nearly two-thirds of private sector jobs in the U.S.

UFPR appreciates the opportunity to provide this testimony on the critical issue of protecting real innovations by improving patent quality. Our members appreciate the important role the U.S. patent system plays in supporting innovation. But we have also experienced the harm that patent litigation abuse facilitated by low-quality patents can cause. These abuses can be a serious drag on innovation and job creation, and can erode public confidence in the patent system.

Much of that abuse is perpetrated by non-practicing entities (NPEs), which exist only to buy up patents and threaten productive businesses with costly litigation. From 2005 to 2015, the number of NPE suits quadrupled, placing a crushing burden on U.S. businesses that create jobs across all sectors of the economy. We experienced a welcome slowdown starting in 2016, although the overall level of NPE litigation remained at record highs compared to earlier years. But as the most recent data shows, abusive patent litigation is once again on the rise as NPEs take advantage of worsening conditions in the U.S. patent system.¹



¹ See “Q4 in Review: 2020 Ends with Litigation Increase Despite Pandemic as Courts Tackle SEP Issues,” RPX Blog (Jan.13, 2021) <https://www.rpxcorp.com/intelligence/blog/q4-in-review-2020-ends-with-litigation-increase-despite-pandemic-as-courts-tackle-sep-issues/#litigation-update:-district-court-litigation-increased-in-2020-despite-covid-19-and-slight-q4-dip,-driven-by-npe-filings>.

The increase in NPE patent litigation continued throughout the COVID-19 pandemic. While businesses like restaurants, grocery stores, retailers, and many other Main Street establishments were reimagining how to do business, relying on technology to make dining and shopping safer, those same businesses were forced to fend off abusive patent lawsuits brought by NPEs. Among those getting sued were companies that sought and received loans under the Paycheck Protection Program, which means money that was intended to help retain jobs and rebuild businesses instead went into the pockets of NPEs.²

These lawsuits impact businesses across the country. Some examples are below.³

- California: Fast-food chain Jack in the Box was among several other restaurants, plus hotels and retailers, targeted for using an app to maintain a remote connection with a server through a mobile device.
- Georgia: Waffle House, Chick-fil-A, and Zaxby's were sued for using remote devices, QR codes, and GPS tracking.
- North Carolina: Dole Foods, headquartered in Charlotte, was sued for using website navigation and is one of 50 parties to be targeted in the litigation so far.
- Texas: Supermarket H-E-B was sued – by the same NPE that sued its Austin-based subsidiary, food delivery company Favor Delivery – for using a website job search service.

To restore the public's confidence in the patent system, we believe that it is imperative to have a renewed focus on improving patent quality at the U.S. Patent and Trademark Office. And for the next director of the Patent and Trademark Office, it is equally imperative to choose a candidate who recognizes that improvements are needed and will take swift action to address them. As this hearing rightfully acknowledges, the patent system exists to promote and protect real innovation for the benefit of the American public, not to issue undeserving patents that place a drag on innovation and are used to go after productive businesses.

² See "Paycheck Protection Recipients Among NPE Targets," Patent Progress (Aug. 26, 2020) <https://www.patentprogress.org/2020/08/26/paycheck-protection-recipients-among-npe-targets/>.

³ See "Main Street's Economic Recovery Hampered by Abusive Patent Lawsuits" (providing a more extensive summary of patent litigation against Main Street businesses during the pandemic) <https://unitedforpatentreform.com/files/files/Main%20Street%20Case%20Studies.pdf>.

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Submitted Statement for the Record of the
Coalition Against Patent Abuse

Before the
Subcommittee on Intellectual Property
of the
Committee on the Judiciary
United States Senate

Hearing on
Protecting Real Innovations by Improving Patent Quality

June 22, 2021

STATEMENT OF THE COALITION AGAINST PATENT ABUSE

CHAIRMAN LEAHY, RANKING MEMBER TILLIS, AND MEMBERS OF THE SUBCOMMITTEE:

The Coalition Against Patent Abuse thanks the Subcommittee for holding this hearing on patent quality. CAPA is a coalition of healthcare providers, consumer groups, patient advocacy organizations, free market advocates, employers, and others fighting abuses of the patent system that can extend government-granted monopolies that illegitimately keep drug prices high for years, or even decades. CAPA produces research and analysis on patents and drug costs aimed at educating lawmakers and policy experts on issues vital to American health care.¹

Low-quality patents are an important driver of pharmaceutical monopolies that render drugs unaffordable or inaccessible to American patients, and improving patent quality will go far toward resolving today's crisis of skyrocketing drug prices. A critical part of patent quality is the inter partes review proceeding for challenging patents of questionable validity. Members of this Subcommittee wisely shepherded the enabling legislation for inter partes review to enactment in 2011. In the eight years that it has been in effect, inter partes review and related patent challenge proceedings have proven effective in overcoming abuse of patents that improperly block competition, raise prices, and stifle future innovation. That critical role is plainly observable in the context of drug patents, where infirmities in patent examination allow pharmaceutical firms to obtain questionable patents that wrongly block generic competition and cost Americans hundreds of millions of dollars every year. Inter partes review has successfully distinguished patents representing genuine innovation from those that serve largely to preserve pharmaceutical monopoly profits without concomitant public benefit.

CAPA's research on inter partes reviews, presented below, reveals the effectiveness and value of those proceedings and the Board that conducts them. The case studies show that patents declared erroneous in those proceedings are manifestly uninventive "secondary" patents designed to extend monopoly prices beyond the congressionally specified patent term. They show that cancellation of those patents can lower drug prices

¹A list of CAPA members may be found on the website <https://www.capanow.org/>. Opinions expressed herein reflect the views of the coalition but not necessarily those of the individual members.

by 98%, because they enable multiple competitors, even ones beyond the firms bringing the patent challenges, to compete vigorously on prices. And they show why the Board has proven to be an effective venue for such challenges: because the administrative patent judges on the Board have the qualifications to understand complex technological facts in patent cases and apply patent law to those facts objectively, such that judicial review affirms the Board over 80% of the time.

Nevertheless, in recent years the prior administration has taken a number of detrimental steps to weaken the effectiveness of inter partes review, making it a less viable tool for ensuring patent quality and eliminating undue monopolies on essential drugs. CAPA thus calls on this Subcommittee to consider reforms to inter partes review that would undo these changes and further strengthen the proceedings in service of lower drug prices, increased competition, and greater patient access.

I. THE IMPORTANCE OF INTER PARTES REVIEW AND PATENT QUALITY TO LOWERING DRUG PRICES

When it created the Patent Trial and Appeal Board in 2011 to adjudicate inter partes review proceedings, Congress hoped to overcome serious and systematic flaws in the American patent system that enabled wrongfully issued patents to block competition and injure the American public.² In the context of pharmaceutical patents,³ the Board and inter partes review have been invaluable to approaching the United States drug pricing crisis.

Skyrocketing drug prices today certainly merit the term “crisis.” Eight in ten surveyed Americans describe the cost of prescription drugs as “unreasonable,”⁴ and the “rising price of prescription drugs was an important factor” to a majority of voters of all parties.⁵

²See H.R. REP. NO. 112-98, at 46–48 (2011); Joe Matal, *A Guide to the Legislative History of the America Invents Act: Part II of II*, 21 FED. CIR. B.J. 539, 600–02 (2012).

³For simplicity, this brief throughout uses the terms “pharmaceuticals” and “drugs” to refer to the broad class of chemical therapeutic medicines, and “generics” to refer to subsequent competitive products that are roughly market substitutes. In industry parlance, those terms refer only to small-molecule products, while large-molecule therapeutics are analogously designated “biologics” and “biosimilars”; the differences are immaterial to this case.

⁴See Ashley Kirzinger et al., *KFF Health Tracking Poll—February 2019: Prescription Drugs*, KAISER FAM. FOUND. (Mar. 1, 2019), <https://www.kff.org/health-costs/poll-finding/kff-health-tracking-poll-february-2019-prescription-drugs/>.

⁵COAL. AGAINST PATENT ABUSE & MORNING CONSULT, *REFORMING THE PATENT SYSTEM 1* (Nov. 2020), https://www.capanow.org/wp-content/uploads/2020/11/CAPA_Memo_MC.pdf.

Unaffordability has harmed Americans, with nearly a third of surveyed adults reported not taking medicines as prescribed because of costs, and 29% of them reportedly became sicker as a result.⁶ Indeed, researchers attribute between 112,000 and 125,000 deaths a year to patients who fail to take necessary medications because they cannot afford them.⁷

The most straightforward approach to overcoming this drug pricing problem is competition.⁸ Having multiple firms selling a drug can cut prices tremendously—over 95% in some cases, a U.S. Food and Drug Administration study finds.⁹ The Government Accountability Office similarly concludes that generics cost on average 75% less than the brand-name equivalent, and substitution of generic drugs between 1999 and 2010 saved Americans more than \$1 trillion.¹⁰ Because patents by definition are government-granted privileges to escape competition, multiple surveys find that Americans overwhelmingly blame pharmaceutical patents and the firms that hold them for the unreasonable costs of drugs.¹¹

Inter partes reviews conducted by the Board have played a key role in stemming these harms. The case studies that follow were gathered by correlating drug patent inter partes review outcomes where all patent claims were canceled, against Medicaid and other data on drug prices.¹² Several key features of the Board emerge from this study, pointing to

⁶See Kirzinger et al., *supra* note 4.

⁷See XCENDA AMERSOURCEBERGEN, MODELING THE POPULATION OUTCOMES OF COST-RELATED NONADHERENCE: MODEL REPORT 13 tbl.6 (2020), <https://www.cidsa.org/publications/xcenda-summary>; ASS'N FOR ACCESSIBLE MEDS., GENERIC DRUG ACCESS & SAVINGS IN THE U.S. 26 (2017), <https://accessiblemeds.org/resources/blog/2017-generic-drug-access-and-savings-us-report>.

⁸See U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-18-40, DRUG INDUSTRY: PROFITS, RESEARCH AND DEVELOPMENT SPENDING, AND MERGER AND ACQUISITION DEALS 47–50 (Nov. 2017), <https://www.gao.gov/assets/690/688472.pdf> (citing studies).

⁹RYAN CONRAD & RANDALL LUTTER, U.S. FOOD & DRUG ADMIN., GENERIC COMPETITION AND DRUG PRICES: NEW EVIDENCE LINKING GREATER GENERIC COMPETITION AND LOWER GENERIC DRUG PRICES 3 (Dec. 2019), <https://www.fda.gov/media/133509/download>.

¹⁰See Letter from John E. Dicken, U.S. Gov't Accountability Office, to Orrin G. Hatch, U.S. Senate, GAO-12-371R: *Savings from Generic Drug Use* (Jan. 31, 2012), <https://www.gao.gov/assets/590/588064.pdf>.

¹¹See COAL. AGAINST PATENT ABUSE & MORNING CONSULT, *supra* note 5, at 1; Kirzinger et al., *supra* note 4.

¹²Specifically, this analysis uses National Average Drug Acquisition Cost (NADAC) weekly reference data, which is based on monthly pharmacy surveys and other data. See CTRS. FOR MEDICARE & MEDICAID SERVS., METHODOLOGY FOR CALCULATING THE NATIONAL AVERAGE DRUG ACQUISITION COST (NADAC) FOR MEDICAID COVERED OUTPATIENT DRUGS 20 (Nov. 2013), <https://www.medicare.gov/medicaid-chip-program-information/by-topics/prescription-drugs/ful-nadac>.

inter partes review being a strong mechanism for overcoming the ongoing problems of skyrocketing drug prices.

Most obviously, the effect of inter partes review on questionable drug patents is to lower prices—often dramatically. Cancellation of erroneous patents on a drug opens the door to generic competition, and that competition brings prices down on average 75%, saving American consumers over \$100 billion a year according to the Government Accountability Office.¹³ The case studies repeatedly show competition following rapidly after a Board decision in inter partes review, with almost immediate savings of up to 93%.

Monopoly drug prices might be tolerable if the patents backing those prices represented genuine innovation, but the patents that the Board has declared erroneous do not. Instead, the case studies reflect bald manipulation of the patent system to extend monopoly control over drugs that ought to be open to competition.¹⁴ The challenged patents involve mere combinations of well-known drugs, predictable dosage adjustments, and trivial modifications to drug delivery. These “inventions” offered insignificant benefits or even caused harm, in one case being the centerpiece of a drug company’s fraudulent scheme that led to a \$1.7 billion fine.

These “follow-on” or “secondary” patents, so called because they are directed not to the active ingredient of a drug but to uses or formulations,¹⁵ frequently fail in litigation against generics¹⁶ and are often described as as “weak” or “less solid” even by the very

downloads/nadacmethodology.pdf.

¹³See Dicken, *supra* note 10; U.S. GOV’T ACCOUNTABILITY OFFICE, *supra* note 8, at 47–50.

¹⁴By contrast, there is no evidence of the Board being overbearing on legitimately issued patents. A study of inter partes reviews between 2012 and 2017 found that only 7 out of 198 challenged drug patents were directed to active ingredients, with only 2 such challenges successful in canceling all disputed patent claims. See Jonathan J. Darrow et al., *The Generic Drug Industry Embraces a Faster, Cheaper Pathway for Challenging Patents*, 17 APPLIED HEALTH ECON. & HEALTH POL’Y 47, 51 (2018). Moreover, while there were some initial concerns about abuse of inter partes review to manipulate drug companies’ stock prices, those practices were apparently “a complete failure” and now are largely “all but over.” Matthew Bultman, *Hedge Fund Drug Patent Challenges in Doubt After Bass’ Test*, LAW360 (Mar. 31, 2017), https://www.sternekessler.com/sites/default/files/2018-01/Hedge_Fund_Drug_Patent_Challenges_In_Doubt_After_Bass_Test.pdf.

¹⁵On secondary patents, see generally KEVIN T. RICHARDS ET AL., CONG. RESEARCH SERV., REPORT NO. R46221, DRUG PRICING AND PHARMACEUTICAL PATENTING PRACTICES 9, 16–19 (Feb. 11, 2020), <https://www.everycrsreport.com/reports/R46221.html>.

¹⁶See, e.g., C. Scott Hemphill & Bhaven Sampat, *Drug Patents at the Supreme Court*, 339 SCIENCE 1386, 1387 (2013); COMPETITION DIR.-GEN., EUROPEAN COMM’N, PHARMACEUTICAL SECTOR INQUIRY: FINAL REPORT para. 501, at 191 (July 8, 2009), https://ec.europa.eu/competition/sectors/pharmaceuticals/inquiry/staff_working_paper_part1.pdf.

companies obtaining them.¹⁷ Nevertheless, the number of secondary patents is large and growing,¹⁸ with pharmaceutical firms acknowledging that those patents have the intended purpose of “extending the term of the existing compound patent.”¹⁹

Why the Board is especially important in overcoming improper secondary drug patents is another insight to be gleaned from these case studies. Members of the Board are required to have “competent legal knowledge and scientific ability,”²⁰ and that expertise has proven valuable to the correct disposition of drug patent cases that can involve difficult scientific facts. On at least one occasion the appellate court praised the Board for providing “ample” evidence in support of its conclusions; the fact that the Board is affirmed on appeal more frequently than the district courts further confirms its competence.²¹

The case studies further show that the outcome of inter partes review is not just that the challenger may enter the market, but that other generic manufacturers may do so as well. In several cases, cancellation of patents by inter partes review opened the door to market competition by third party competitors uninvolved in the proceeding. This is critical for lowering drug prices because savings from generic entry are sharply related to the number of competitors. Per the FDA study, a single generic brings prices down by about 39%, while six or more competitors drops prices by 95% on average.²² Where inter partes review has enabled multiple generic competitors to enter the market, it has especially contributed to solving this American crisis.

A. Opioid Addiction

In 2008, British pharmaceutical firm Reckitt Benckiser reaped over 540 million on its

¹⁷COMPETITION DIR.-GEN., EUROPEAN COMM’N, *supra* note 16, para. 504, at 192 (quoting pharmaceutical firm); *see* C. Scott Hemphill & Bhaven N. Sampat, *When Do Generics Challenge Drug Patents?*, 8 J. EMPIRICAL LEGAL STUD. 613, 644 (2011).

¹⁸*See* Robin Feldman, *May Your Drug Price Be Evergreen*, 5 J.L. & BIOSCIENCES 590, 630 & tbl.6 (2018); Hemphill & Sampat, *supra* note 17, at 619; Amy Kapeczynski et al., *Polymorphs and Prodrugs and Salts (Oh My!): An Empirical Analysis of “Secondary” Pharmaceutical Patents*, 7 PLOS ONE No. e49470, 4 tbl.1 (2012), <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0049470>.

¹⁹COMPETITION DIR.-GEN., EUROPEAN COMM’N, *supra* note 16, para. 526, at 196 (quoting pharmaceutical firm).

²⁰*See* 35 U.S.C. § 6(a).

²¹*See* Jason Rantanen et al., *Federal Circuit Statistics Update—September 2020*, PATENTLY-O (Sept. 15, 2020), <https://patentlyo.com/patent/2020/09/federal-statistics-september.html>.

²²*See* CONRAD & LUTTER, *supra* note 9, at 2–3 & fig.

blockbuster opioid addiction treatment buprenorphine/naloxone, sold under the brand name Suboxone.²³ But it stood to lose that revenue stream when the company's federal regulatory exclusivity expired in 2009, opening the drug to generic competition.²⁴ In an effort to maintain its monopoly position, Reckitt Benckiser devised a scheme to switch buprenorphine patients from a tablet-form medicine to a "sublingual film" designed to dissolve under the tongue; patents on the latter formulation would have prevented generic entry through at least 2023.²⁵ Despite no evidence that the latter formulation was an improvement and indeed some indications that it was more dangerous to children, Reckitt Benckiser and its corporate successor Indivior propounded numerous false advertisements and studies claiming that the sublingual film was safer for households with children.²⁶

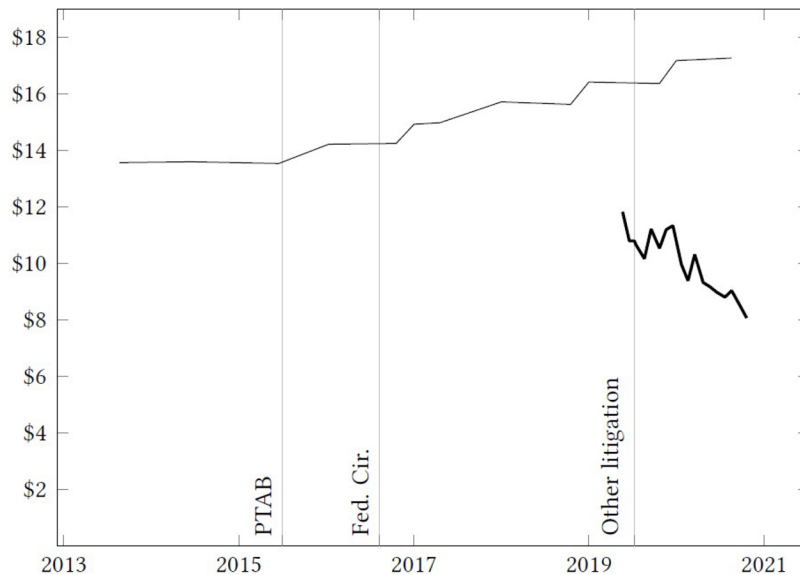


Figure 1: Brand and generic prices of buprenorphine 12mg/naloxone 3mg (Suboxone)

²³See RECKITT BENCKISER GRP. PLC, ANNUAL REPORT AND FINANCIAL STATEMENTS 2008, at 20 (Mar. 2009) (applying currency exchange rate of 1.6).

²⁴See *id.* at 18; Rebecca L. Haffajee & Richard G. Frank, *Generic Drug Policy and Suboxone to Treat Opioid Use Disorder*, 47 J.L. MED. & ETHICS 43, 44 (2019).

²⁵See Haffajee & Frank, *supra* note 24, at 45.

²⁶See Plea Agreement at Exh. B, paras. 18–26, at 5–8, *United States v. Indivior Sols., Inc.*, No. 1:19-cr-16 (W.D. Va. July 27, 2020) (Doc. No. 427-5).

sublingual film.

In July of 2020, Indivior pleaded guilty to fraud and agreed to a 290 million fine, following a 1.4 billion settlement by Reckitt Benckiser.²⁷ But the scheme was successful in its legacy: Most buprenorphine users switched to the film formulation, and Indivior discontinued its own sales of the tablet.²⁸ Undoing the fraud, then, required undoing the patents that monopolized the film formulation, and inter partes review was the tool to do so. In the 2015 proceeding, the Board found error in one of Indivior's key patents on the sublingual film; the Court of Appeals affirmed.²⁹

In combination with other litigation on Indivior's other patents,³⁰ the inter partes review decision opened the door to generic competition on Suboxone film as of 2019. At least thirteen generics are now approved for sale, and prices have dropped about 50% compared to the peak brand price. Inter partes review created tremendous patient savings by enabling competition, despite a patent holder's brazen efforts to stifle it.

B. Insulin

Glargine is a modern formulation of insulin that releases itself slowly into the bloodstream, reducing the number of injections needed. Sanofi's patents on its glargine product, Lantus, were declared erroneous in 2019.³¹ But generic entry was not immediately possible because Sanofi also held patents on the SoloStar injector pen device in which it distributed Lantus; regulatory approval required an equivalent generic injector.³² To enable generic competition on glargine, then, several generic manufacturers sought inter partes review against Sanofi's SoloStar injector pen patents.³³

²⁷See *id.* at 3 tbl.; Press Release, U.S. Dep't of Justice, *Justice Department Obtains \$1.4 Billion from Reckitt Benckiser Group in Largest Recovery in a Case Concerning an Opioid Drug in United States History* (July 11, 2019), <https://www.justice.gov/opa/pr/justice-department-obtains-14-billion-reckitt-benckiser-group-largest-recovery-case>.

²⁸See Haffajee & Frank, *supra* note 24, at 46, 48–49.

²⁹See *BioDelivery Scis. Int'l, Inc. v. RB Pharm. Ltd.*, No. IPR2014-00325, slip op. at 2 (P.T.A.B. June 30, 2015) (final written decision), *aff'd without opinion*, 667 F. App'x 997 (Fed. Cir. 2016).

³⁰See *Indivior Inc. v. Dr. Reddy's Labs.*, SA, 930 F.3d 1325, 1330–31 (Fed. Cir. 2019).

³¹*Sanofi-Aventis Deutschland GmbH v. Mylan Pharm. Inc.*, No. 2012-1368, -1369, slip op. at 20 (Fed. Cir. Nov. 19, 2019) (nonprecedential).

³²On the use of device patents to block generic drug competition, see Reed F. Beall & Aaron S. Kesselheim, *Tertiary Patenting on Drug-Device Combination Products in the United States*, 36 *NATURE BIOTECHNOLOGY* 142, 143 (2018).

³³See *Mylan Pharm. Inc. v. Sanofi-Aventis Deutschland GmbH*, No. IPR2018-01678, at 2 (P.T.A.B. May 29, 2020) (final written decision), *appeal filed*, No. 20-1871 (Fed. Cir. June 10, 2020).

Challenges to the SoloStar patents revealed how little innovation the product accounted for. The supposedly novel injector pen was strikingly similar to the many other insulin injectors earlier on the market, with only the minor changes to features such as screw threads that the Board deemed obvious to one of ordinary skill in mechanical engineering.³⁴ In an effort to overcome this outcome, Sanofi contended that the SoloStar had performed superiorly in the market compared to other insulin pens, but the evidence before the Board proved almost the opposite: The Board credited testimony that the SoloStar was “not recognized as an unusually good pen” and was “in a statistical tie” with a competitor.³⁵ Market demand for the SoloStar appeared to be driven by consumer preference not for the device but for the glargine inside it.³⁶

The apparent lack of valuable innovation in the SoloStar pen is consistent with the view, also posited in an antitrust case that the First Circuit recently allowed to proceed, that the SoloStar patents were no more than an “effective extension of Sanofi’s monopoly.”³⁷ Subsequent generic entry confirms that view: After successful inter partes reviews, Mylan received approval for and announced plans to launch a generic glargine injector pen, at a list price of 147.98 for five pens compared to 425.31 for the Lantus SoloStar.³⁸

Notably, Mylan announced this 65% price cut while Federal Circuit appeals were pending on the SoloStar patents; the company stated it was “confident” that the appeals “will not affect commercialization.”³⁹ That confidence reflects an ongoing recognition that the Board’s inter partes review decisions are of such high quality—the Federal Circuit fully affirms the Board in 80% of appeals⁴⁰—that pharmaceutical manufacturers are willing to stake millions in potential damages on at-risk launches based on those

³⁴See, e.g., *id.* at 34 (finding that “one of ordinary skill in the art would have reasonably expected the modified parts to perform the same function as before”).

³⁵*Id.* at 87–88.

³⁶See *id.* at 87, 103–05.

³⁷*In re Lantus Direct Purchaser Antitrust Litig.*, 950 F.3d 1, 2 (1st Cir. 2020).

³⁸See Press Release, Mylan N.V., *Mylan and Biocon Biologics Announce Launch of Semglee (insulin glargine injection) in the U.S. to Expand Access for Patients Living with Diabetes* (Aug. 31, 2020), <http://newsroom.mylan.com/2020-08-31-Mylan-and-Biocon-Biologics-Announce-Launch-of-Semglee-TM-insulin-glargine-injection-in-the-U-S-to-Expand-Access-for-Patients-Living-with-Diabetes>; SANOFI-AVENTIS U.S. LLC, *HOW MUCH SHOULD I EXPECT TO PAY FOR LANTUS?* (Oct. 2019), <https://www.lantus.com/-/media/EMS/Conditions/Diabetes/Brands/Lantus2/Consumer/Lantus-Pricing.pdf>.

³⁹See Mylan N.V., *supra* note 38.

⁴⁰See Rantanen et al., *supra* note 21.

decisions.

C. Prostate Cancer

Abiraterone acetate, used to treat prostate cancer, has been known since at least 1994, and patents on the compound expired about 2014.⁴¹ Janssen Biotech markets and holds patents to a formulation called Zytiga, in which abiraterone is prescribed for use in combination with “a therapeutically effective amount of prednisone,” a well-known steroid.⁴²

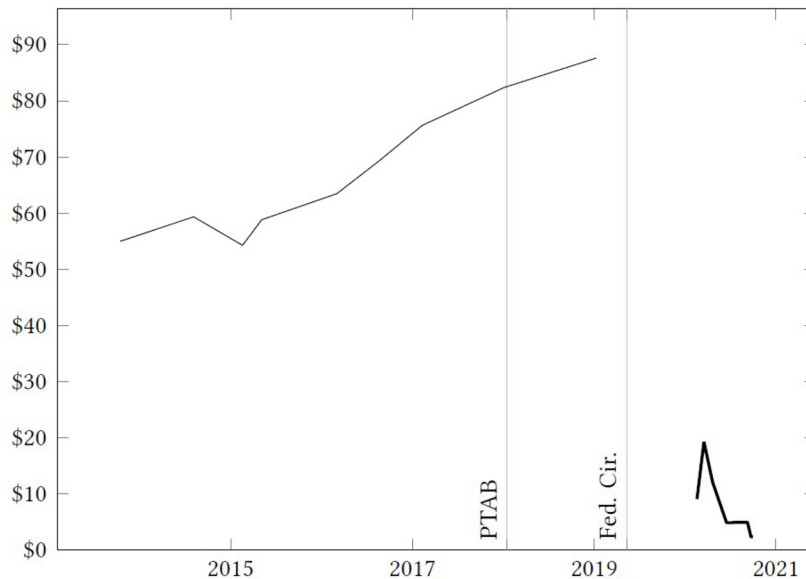


Figure 2: Brand and generic prices of abiraterone acetate 250mg (Zytiga).

In inter partes review, the Board deemed the combination patent erroneously obvious, and the Federal Circuit agreed in view of evidence that both abiraterone and prednisone were “individually considered promising prostate cancer treatments,” and ordinary

⁴¹See *Abiraterone Acetate*, 10 *DRUGS R & D* 261 (2010); *A New Way to Treat Prostate Cancer: The Story of Abiraterone*, *INST. CANCER RES.* (May 26, 2011), <https://www.icr.ac.uk/news-features/latest-features/a-new-way-to-treat-prostate-cancer-the-story-of-abiraterone>.

⁴²See *BTG Int'l Ltd. v. Amneal Pharm. LLC*, 923 F.3d 1063, 1066–67 (Fed. Cir. 2019).

scientists had no reason to doubt that the two treatments would be more effective together.⁴³ Indeed, evidence before the Board showed that combining steroids with other anti-cancer treatments was not just “common practice” but indeed “the standard regimen” at the time that Janssen’s patent was applied for.⁴⁴

Upon the Federal Circuit’s conclusion that this obvious combination was unpatentable, generic competitors entered at a price of 2–19 per dose, compared to 88 for the brand. Inter partes review thus enabled almost 98% savings on a drug that the World Health Organization lists as one of the “essential medicines for priority diseases” that constitute “minimum medicine needs for a basic health-care system.”⁴⁵

D. Ulcerative Colitis

Mesalamine treats certain gastrointestinal disease that affects about a million Americans. While mesalamine was well-known and studied as early as the 1970s,⁴⁶ the firm Dr. Falk Pharma held a patent on an extended-release capsule formulation marketed as Apriso.⁴⁷ The patent was directed neither to mesalamine nor to the capsule formulation alone, both of which were old and well-known, but rather to the practice of administering those capsules without food or antacids.⁴⁸

⁴³*Id.* at 1074.

⁴⁴*Id.* at 1074–75.

⁴⁵See WORLD HEALTH ORG., MODEL LIST OF ESSENTIAL MEDICINES 32 (21st ed. 2019), <https://apps.who.int/iris/bitstream/handle/10665/325771/WHO-MVP-EMP-IAU-2019.06-eng.pdf>.

⁴⁶See A.K. Azad Khan et al., *An Experiment to Determine the Active Therapeutic Moiety of Suphasalazine*, 310 LANCET 892 (1977); John Mayberry, *The History of 5-ASA Compounds and Their Use in Ulcerative Colitis—Trailblazing Discoveries in Gastroenterology*, 22 J. GASTROINTESTINAL & LIVER DISEASES 375, 376 (2013).

⁴⁷See U.S. Patent No. 8,865,688 (issued Oct. 21, 2014).

⁴⁸See *id.* col. 34, ll. 15, 19–20.

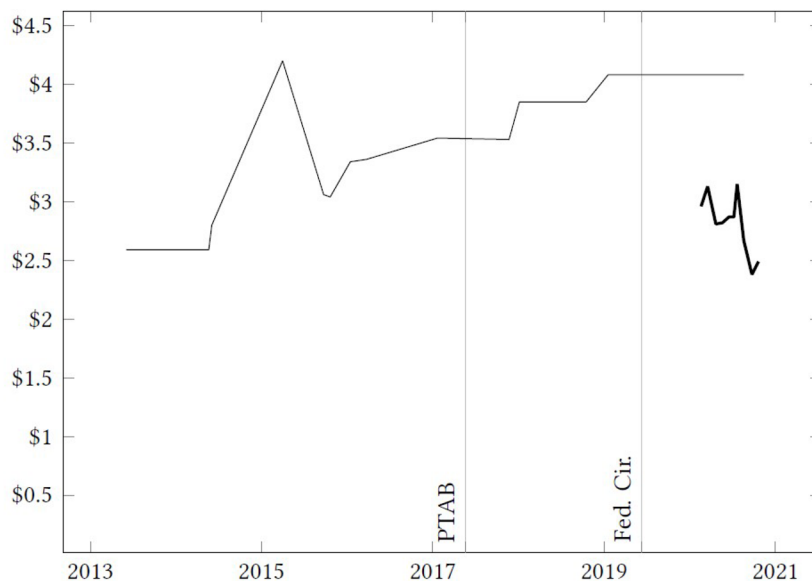


Figure 3: Brand and generic prices of mesalamine 0.375g (Apriso) extended release capsule.

In an inter partes review proceeding affirmed on appeal, the Board deemed the patent obvious. Regarding taking the drug without antacids, the Board concluded that doing so would have been obvious to any ordinary scientist, who would have known that antacids decrease stomach acidity (hence the name) and thus would undermine the capsule’s acidity-dependent coating.⁴⁹ The Board found administration without food an even less compelling “innovation.” Citing a decades-old academic paper on how food-triggered digestive processes affect drug absorption, the Board concluded that an ordinary researcher would have known that “a drug intended for the colon should be administered without food.”⁵⁰

Generic entry occurred about October 2019, and in the short time up to now, prices have come 42% down.

⁴⁹See *GeneriCo, LLC v. Dr. Falk Pharma GmbH*, No. IPR2016-00297, at 26–27 (P.T.A.B. May 19, 2017) (final written decision), *aff’d*, No. 17-2312 (Fed. Cir. June 12, 2019) (nonprecedential).

⁵⁰See *id.* at 36–37.

E. Heart Disease

Prasugrel is an anti-blood clot drug used to treat cardiovascular disease; the brand formulation is Effient. The patent on the drug itself expired in 2017, but Daiichi Sankyo also held later-expiring patents on “methods of using Effient with aspirin,” which effectively extended patent protection by six years.⁵¹

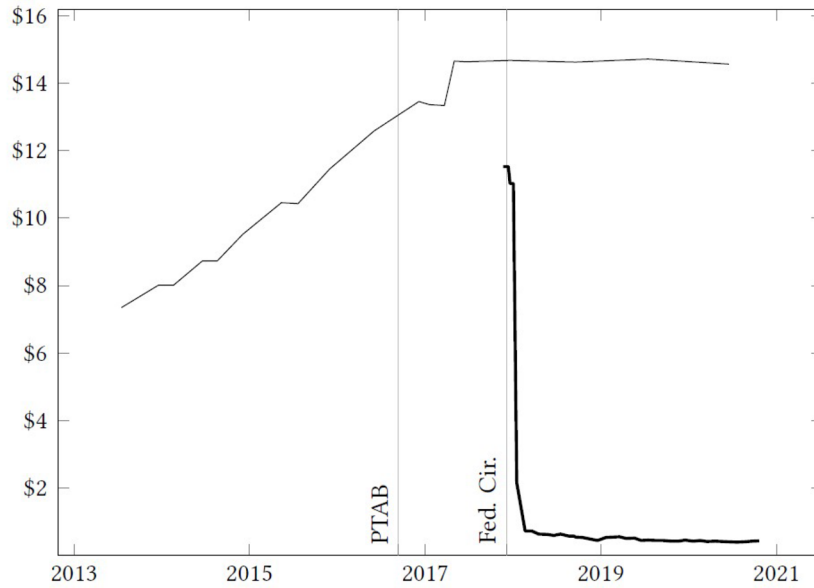


Figure 4: Brand and generic prices of prasugrel 10mg (Effient).

⁵¹Eli Lilly & Co., Annual Report (Form 10-K), at 10 (Feb. 21, 2017). Eli Lilly markets Effient in the United States.

Since aspirin is a blood thinner that also limits blood clots, the Board in inter partes review concluded that the combination of aspirin and prasugrel was obvious.⁵² Tracing prasugrel's predecessors, the Board found consistent use of aspirin in combination with increasingly powerful anti-clotting agents, and concluded that an ordinary researcher "would have followed the rationale" of that prior art to "select[] the more potent, and preferred ADP-receptor blocking anti-platelet drug, i.e., prasugrel," as the predictable next choice for the combination.⁵³

The costs of the improper Effient patent extension were made apparent once generic competitors entered in 2017, at prices 97% below the brand cost.

F. Anemia

Erythropoietin is a biologic compound used in the treatment of anemia. The compound is naturally produced by the kidney and was purified as far back as 1977,⁵⁴ but Janssen Pharmaceuticals held a patent reciting a dosing regimen of 5–30 days between doses.⁵⁵

Hospira petitioned for inter partes review on the grounds that the dosing regimen had already been revealed in the same inventor's earlier patent filing from two years earlier; Janssen apparently agreed and directed the Patent Office to cancel the relevant patent claims.⁵⁶ Had Hospira not challenged the later-filed patent, Janssen would have enjoyed about two extra years of improper patent term. But because inter partes review resulted in cancellation of the patent claims, several erythropoietin biosimilars have now entered the market, saving patients about 57%.⁵⁷

II. STRENGTHENING PATENT QUALITY BY UNDOING RECENT CUTBACKS TO THE EFFECTIVENESS OF INTER PARTES REVIEW

Inter partes review, as conducted by the Patent Trial and Appeal Board, has played an

⁵²See *Accord Healthcare Inc. v. Daiichi Sankyo Co.*, No. IPR2015-00864, at 22 (P.T.A.B. Sept. 12, 2016) (final written decision), *aff'd without opinion*, 706 F. App'x 679 (Fed. Cir. 2017).

⁵³*Id.* at 19.

⁵⁴See Takaji Miyake et al., *Purification of Human Erythropoietin*, 252 J. BIOLOGICAL CHEMISTRY 5558 (1977).

⁵⁵U.S. Patent No. 6,746,002 col. 60, l. 6 (issued June 8, 2004).

⁵⁶*Hospira, Inc. v. Janssen Pharm., Inc.*, No. IPR2013-00365, at 2 (P.T.A.B. Oct. 24, 2013).

⁵⁷See Jacob Bell, *Pfizer Launches Biosimilar Version of Amgen's Epogen*, BIOPHARMA DIVE (Nov. 14, 2018), <https://www.biopharmadive.com/news/pfizer-launches-biosimilar-version-of-amgens-epogen/542282/>.

important role in overcoming patents of little public value that wrongfully force Americans to pay inflated drug prices. The stark cost savings of generic entry that follows from inter partes review reflects the ongoing importance of the Board's conducting such proceedings.

Yet recent changes by the Patent Office and courts have significantly diluted the IPR and PGR process to the detriment of the public. For example, the Patent Office recently adopted a "pilot program" for claim amendments that will allow Patent Owners to morph and adapt their patent claims throughout the IPR and PGR process. Congress should enhance the ability of PTO to cut through patent thickets, accelerate pharmaceutical price competition, and lower drug prices for patients and taxpayers. Among other things, it should:

- Eliminate the substantive differences between IPR and PGR by expanding the grounds available during IPR to include patent eligibility, disclosure, and obviousness-type double patenting—a ground that the PTAB already considers in ex parte reexamination.
- Confirm the longstanding judicial rule that actions dismissed without prejudice are treated as if they were never filed.
- Preclude the PTO from issuing a non-substantive institution decision when entirely unrelated parties independently pursue post-grant review on the same patent.
- Recognize the explicit statutory text that "[a]ny party to the inter partes review shall have the right to be a party to the appeal" and confirms that estoppel is injury-in-fact for standing purposes.
- Eliminate the PTO's self-described "counterintuitive" application of estoppel against winning IPR petitioners and confirms that estoppel—consistent with its common law meaning—only applies to losing IPR petitioners.
- Provide concrete deadlines for resolution of a request for rehearing by the PTO given the protracted delays in issuing rehearing decisions in some IPRs and PGRs.
- Reverse the PTO's inefficient practice of allowing patentees to amend their claims repeatedly during IPR.
- Clarify the much-litigated real-party-in-interest standard and adopting the PTO's longstanding practice of allowing a party to correct an improperly identified real-party-in-

interest without losing its filing date.

- Provide an IPR petitioner with a pre-institution reply as of right. Under the PTAB's current rules, the patent owner typically gets the last word even though it does not bear the burden of proof.
- Allow the Federal Circuit to review a legally or factually erroneous decision not to institute IPR or PGR.
- Restore the broadest reasonable interpretation standard as the relevant claim construction standard in post-grant proceedings, which allows PTO to more easily invalidate a patent that never should have been granted.

III. CONCLUSION

CAPA thanks the Subcommittee for its attention to this issue of importance to American patients and the public. If the Subcommittee or its members have questions or would like further information, we would be happy to discuss further.



June 21, 2021

The Honorable Patrick Leahy
 Chairman
 Subcommittee on Intellectual Property
 Committee on Judiciary
 U.S. Senate
 437 Russell Senate Building
 Washington, DC 20510

The Honorable Thom Tillis
 Ranking Member
 Subcommittee on Intellectual Property
 Committee on Judiciary
 U.S. Senate
 113 Dirksen Senate Office Building
 Washington, DC 20510

Dear Chairman Leahy and Ranking Member Tillis:

The Alliance for Automotive Innovation ("Auto Innovators") appreciates your continued commitment to strengthening our patent system and improving patent quality. As the singular, authoritative, and respected voice of the automotive industry, Auto Innovators welcomes the opportunity to provide perspective on these important issues.

As you are aware, the auto industry is a leader in innovation and uses cutting-edge advancements, constant creativity, and investments in research and development to bring the next generation of breakthrough automotive and mobility technologies to consumers. Auto companies are inventors, patent holders, and - more importantly - manufacturers that rely on patent quality to make and sell their products. These patents are essential to protecting the robust investments auto companies make in the new technologies that are transforming personal mobility. At the same time, however, auto companies face frequent lawsuits alleging patent infringement, many of which claim violations of poor quality patents that should never have been issued. For this reason, the auto industry is uniquely positioned to offer a balanced and reasoned perspective on this and other patent-related issues.

We support efforts to improve patent quality. One study estimates that "a surprising 27 percent of all patents would be found at least partially invalid if subject to an anticipation or obviousness decision."¹ This pre-issuance patent quality problem showcases the need for post-grant patent quality efforts like those created by the America Invents Act ("AIA"). Indeed, a recent study estimates that the positive impact of savings generated from AIA post-grant patent quality efforts amounted to an increase of 13,500 job years of employment, \$2.95 billion in gross product, and \$1.41 billion in personal income from 2014-2019.² However, auto companies are still forced to expend significant resources in litigation to defeat assertion of low-quality patents. This unnecessary patent litigation creates inefficiencies in the patent system and slows the ability of auto companies to innovate.

¹ Miller, Shawn Patrick, "Where's the Innovation? An Analysis of the Quantity and Qualities of Anticipated and Obvious Patents" (February 10, 2012). Available at <http://dx.doi.org/10.2139/ssrn.2029263>

² The Perryman Group, "An Assessment of the Impact of the America Invents Act and the Patent Trial and Appeal Board on the US Economy" (June 2020). Available at <https://www.ipwatchdog.com/wp-content/uploads/2020/07/Perryman-PTAB-Impact-Report-6-22-2020-0031.pdf>

To improve pre-issuance patent quality at the Patent and Trademark Office and to reduce the burden caused by improperly issued patents, we recommend that patent examiners be provided additional time to review patent applications for patentability. The positive effects of granting examiners additional time to review patent applications has been well studied.³ We further recommend that patent examiners be provided access to state of the art search tools to help with issuing higher quality patents.

In addition, Patent and Trademark Office policies should be reviewed and, where appropriate, modified to prioritize patent quality. For example, the count system should be reformed to shift the focus to maximizing patent quality rather than maximizing the rate of rendered patentability decisions. A comprehensive review should be conducted to determine whether the current funding system is adequate to sustain a high-quality patent system or whether changes are needed to prevent misaligned incentives.⁴

To prioritize and reward innovation, patent eligibility should be considered broadly. We believe that Section 101 has an important - but limited - role in weeding out low-quality patents. However, we suggest that the Committee consider ways to tighten up Section 103's fairly subjective obviousness standard. If Section 103 were a stronger filter for patentability, it could play an important role in helping to improve overall patent quality.

We appreciate your attention to this important issue and welcome the opportunity to provide any further information that could prove helpful to you in these efforts. We look forward to continuing to engage with you on patent quality and ways to improve the patent system to incentivize true innovation and prevent misuse.

Sincerely,



Hilary M. Cain
Vice President
Technology, Innovation, and Mobility Policy

³ Frakes, Michael D. and Wasserman, Melissa F., "Is the Time Allocated to Review Patent Applications Inducing Examiners to Grant Invalid Patents?: Evidence from Micro-Level Application Data" (July 2014) Available at https://www.oecd.org/site/stipatents/5_4_Frakes_Wasserman.pdf

⁴ Landau, Josh, "Moving the USPTO From Red to Black" (June 10, 2021) Available at <https://www.patentprogress.org/2021/06/10/moving-the-uspto-from-red-to-black/>



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June 15, 2021

The Honorable Amy Klobuchar, Chairwoman
Committee on the Judiciary
Subcommittee on Competition Policy, Antitrust, and Consumer Rights
425 Dirksen Senate Office Building
Washington, D.C. 20510

The Honorable Mike Lee, Ranking Member
Committee on the Judiciary
Subcommittee on Competition Policy, Antitrust, and Consumer Rights
361A Russell Senate Office Building
Washington, D.C. 20510

RE: Hearing on “Protecting Competition and Innovation in Home Technologies”

Dear Chairwoman Klobuchar, Ranking Member Lee, and members of the subcommittee,

R Street appreciates the Committee’s work to protect American consumers and competition as the economy continues to move into the digital age. This hearing presents an opportunity for members to gain a better understanding of the market intricacies for connected home devices.¹ However, recent antitrust discussions appear to focus more on the individual competitors and firms which may struggle to keep up with market leaders, rather than competition as a whole and the effect on consumers.² As the Committee continues to investigate these markets, R Street urges members to focus on the welfare of consumers, rather than the welfare of firms who may struggle to keep up.³

The market for home technologies is dynamic. Companies create products and services due to competition: if a market leader stops innovating, rival firms will develop the next generation of services and products. Connectivity allows devices to provide new functionalities, and larger firms can leverage these devices to create efficiencies that make the network greater than just the sum of its parts. To some extent, interoperability between a single firm’s products will act as a competitive advantage over rivals, as the rival’s single device may not connect to the other devices in a home or lack the full range of functionalities an integrated product would. A Google Nest, for example, can use the virtual assistant to control speakers that play music, while security cameras keep the homeowner informed of any developments outside.

As a result, a rival manufacturer may struggle to develop a product that can offer the same capabilities. However, that doesn’t mean that competition as a whole is harmed. The competitive pressures that



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Suite 900
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drive innovation will continue to provide significant benefits to consumers as firms must continue to innovate or lose customers to competitors.

That is not to say harms to competition cannot exist in these markets. If a firm can exert monopoly power to engage in anticompetitive conduct that excludes competition entirely—meaning the firm can then extract monopoly rents from the consumer—the regulator should step in to mitigate the harms and punish the anticompetitive conduct. This will ensure that rivals will continue to put competitive pressure on the current dominant firms, promoting further innovation and pro-competitive benefits.

R Street commends the Committee for its continued work to ensure markets stay competitive. However, protecting consumers and competition as a whole must remain the goal, with an understanding that integration of products can provide significant benefits. Some rival firms may struggle to compete when an established firm can leverage efficiencies from connectivity between their devices, but that does not mean competitive processes—nor consumers—are harmed. Instead, Congress must carefully consider whether conduct in a given market hurts the competitive process as a whole, and therefore hurts consumers.

Sincerely,

Jeffrey Westling,
Technology and Innovation Policy Resident Fellow
R Street Institute

¹ “Hearing on ‘Protecting Competition and Innovation in Home Technologies,’” Before the Subcommittee on Competition Policy, Antitrust, and Consumer Rights of the Committee on the Judiciary, 117th Cong., June 11, 2021. <https://www.judiciary.senate.gov/meetings/protecting-competition-and-innovation-in-home-technologies>.

² Jeffrey Westling, “Should Antitrust Protect Competitors or Competition,” *Techdirt*, Oct. 23, 2020. <https://www.techdirt.com/articles/20201022/12073345562/should-antitrust-protect-competitors-competition.shtml>.

³ Jeffrey Westling, “Don’t let Senator Hawley fool you: protecting consumers remains the goal,” *R Street Institute*, Apr. 21, 2021.



June 15, 2021

The Honorable Amy Klobuchar
 Chairwoman
 Subcommittee on Competition Policy,
 Antitrust, and Consumer Rights
 Committee on the Judiciary
 United States Senate
 Washington, DC 20510

The Honorable Mike Lee
 Ranking Member
 Subcommittee on Competition Policy,
 Antitrust, and Consumer Rights
 Committee on the Judiciary
 United States Senate
 Washington, DC 20510

RE: Hearing on Protecting Competition and Innovation in Home Technologies

Dear Chairwoman Klobuchar and Ranking Member Lee:

Consumer Reports is pleased the Subcommittee is holding this hearing to examine competition for internet-enabled home technologies. We share your interest in ensuring that companies both big and small have a fair opportunity to compete and innovate to better serve consumers and households.

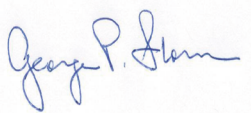
Connected home technologies promise to bring significant benefits for consumers by revolutionizing the operation of basic home products and services, making them more convenient, reducing costs, extending their useful life, and reducing their environmental impact. This progress will be best promoted by keeping the way open for vigorous competition and diverse innovation by companies with different business models and industry backgrounds – not just the existing technology platforms. This progress will be at risk, however, if large online platforms are allowed to leverage their dominance into the connected home and set market rules for all.

We must recognize that the large online platforms have every incentive to do so, as their data-driven business models feed off the large amounts of data generated by connected home products and appliances. More importantly, voice-activated devices in the home, such as smart speakers, are likely to become central to how consumers interact with connected devices at home and with online services more generally. Control over this technology would allow the platform to act as restrictive gatekeeper, either preferencing the offerings of its own affiliates, or anticompetitively picking and choosing among the range of competing offerings.

Throughout our 85-year history, Consumer Reports has emphasized the fundamental importance of competition for ensuring a marketplace that works for consumers, by empowering them with the leverage of choice, the ability to go elsewhere for a better deal, which means businesses have to be responsive to consumers' interests. This spurs a healthy incentive for businesses to keep prices low and quality high, to offer variety, and to innovate. Nurturing this incentive through sound and effective antitrust enforcement and complementary market rules is crucial for the fast-developing connected home technologies sector.

We appreciate the Subcommittee's ongoing commitment to ensuring that the marketplace is functioning competitively as it should, and we look forward to continuing to work with you on this important consumer objective.

Sincerely,



George P. Slover
Senior Policy Counsel
Consumer Reports



Sumit Sharma
Senior Researcher, Technology Competition
Consumer Reports

cc: Members, Subcommittee on Competition Policy, Antitrust, and Consumer Rights



Submitted to the U.S. Senate Judiciary Subcommittee on Intellectual Property for the June 22, 2021 Hearing “Protecting Real Innovations by Improving Patent Quality”:

The US Manufacturers Association for Development and Enterprise (US*MADE) is grateful for the opportunity to submit for the record these comments on improving patent quality. Our members are also grateful to Chairman Leahy and Ranking Member Tillis for holding today’s Judiciary IP Subcommittee Hearing on Protecting Real Innovations by Improving Patent Quality.

[US*MADE](#) is an American manufacturing coalition made up of a diverse group of companies and trade groups of varying sizes and industry sectors. [Our members](#) include a North Carolina father and son fishing tackle manufacturer at one end of the spectrum and an American semiconductor maker with manufacturing operations in over a dozen states at the other.

Manufacturers have reaped tremendous benefits from our patent system and value the patent system’s critical role in fueling innovation in the U.S. Most US*MADE members are patent holders and some are the leading patent holders in their industry sectors.

They have also experienced what can happen on those occasions when the U.S. Patent and Trademark Office (USPTO) issues a “bad patent.” A patent may be bad for any number of reasons. It might be overly broad; it might cover an area already covered by one or more other patents; it might be obvious or not truly represent a new or novel invention, and so on.

What our members have experienced in those instances has been a non-practicing entity (NPE) wielding these bad patents, using them to filing litigation or threatening to do so. In many instances, the royalty demands sought by the NPE – while outrageous given the low quality of the patent – are just low enough to make it more economical to pay the NPE off than to mount a winning defense. In addition, there is always risk that a jury with no expertise in the manufacturing or other technology at issue makes a mistake regarding the often highly complex issues of infringement or patent validity, providing the NPE the chance of an unjustified windfall at the expense of the manufacturer’s business. These perverse incentives cause many American manufacturing companies to simply pay to license what are often worthless patents, sometimes for IP that is not even associated with the products they produce.

The USPTO does an excellent job. But, with over 600,000 new patent applications being filed and 300,000 new patents being issued annually, it is inevitable some number of bad patents may be granted.

US*MADE believes there are things that can be done to improve patent quality before patents are granted. Like many stakeholders in the patent system, we believe more resources should be invested in the process at the front end. Beyond perhaps the obvious (more examiners, better training for them), we would hope some of those resources would be put toward access to better prior art sources. More often than not it seems that outside sources are the ones bringing the best, most up-to-date prior art to the USPTO. We also believe a system in which applications each have a 'second set of eyes' on them from another examiner at certain milestone points in the prosecution could add substantial quality benefits.

We also strongly believe that making changes under 35 U.S.C. §112 could have a substantial impact on improving pre-issuance patent quality. 35 U.S.C. §112(a) states:

"The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms..." (emphasis added)

A common characteristic we see in bad patents is that the terms used in the patent's claims often do not also appear in the same patent's specification. This seems to run counter to the intention (if not the requirement) stated in 35 U.S.C. §112(a). Under the law as written, the specification is essential to determining what the patent is actually claiming. If the same words are not used in both the specification and the claim, this is more difficult to do.

Sometimes applicants or counsel for applicants may use different words in the specification and the claim for the purpose of introducing ambiguity to later argue in litigation that the claims are broad enough to cover post-invention improvements by others. If the same words were required to be used in both the specification and the claim, this sort of gaming of the system would be reduced.

Indeed, the recent Federal Circuit decision in *Hyatt v. Hirshfeld*, No. 18-2390 (Fed. Cir. 2021) perhaps best exemplifies how the USPTO can be mired with extra work because of abusive prosecution tactics, describing that 532 years would be required to ascertain priority dates and examine claims in about 400 applications. Although limiting patent terms to 20 years from the priority date has helped, applicants today can still engage in many of the abusive practices described in that case. Additional protective measures are still needed.

Currently, in the reissue or reexamination process, patent owners are required to identify where the support for the claim they are seeking to amend can be specifically found in the specification. Holding patent applicants to the same standard, pre-issuance, that they are held to post-grant would go a long way toward improving patent quality.

Such a change would be a benefit to patent examiners, who are seeking greater clarity and quality in the patents they grant; the public, who would benefit from more sound patents being issued; the courts, who would not have to wade through the confusion associated with intentionally vague patents; and entities like US*MADE's manufacturer members would be in a better position to evaluate a patent for potential licensing or litigation.

Similarly, in 35 U.S.C. §112(f) we often see patents in which the means for performing a specified function simply does not include the corresponding structure described in the specification. This certainly seems to run counter to the law as intended in this section and in 35 U.S.C. §112(b), which requires claims particularly point out and distinctly define the meets and bounds of the subject matter to be protected by the patent grant. Put simply, in any means + function claim, the means must include the corresponding structure described in the specification and do so using the same words and terms throughout.

Testimony of US Manufacturers for Enterprise and Development ([US*MADE](#))

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Beau Phillips, Executive Director

beau@resetpa.com