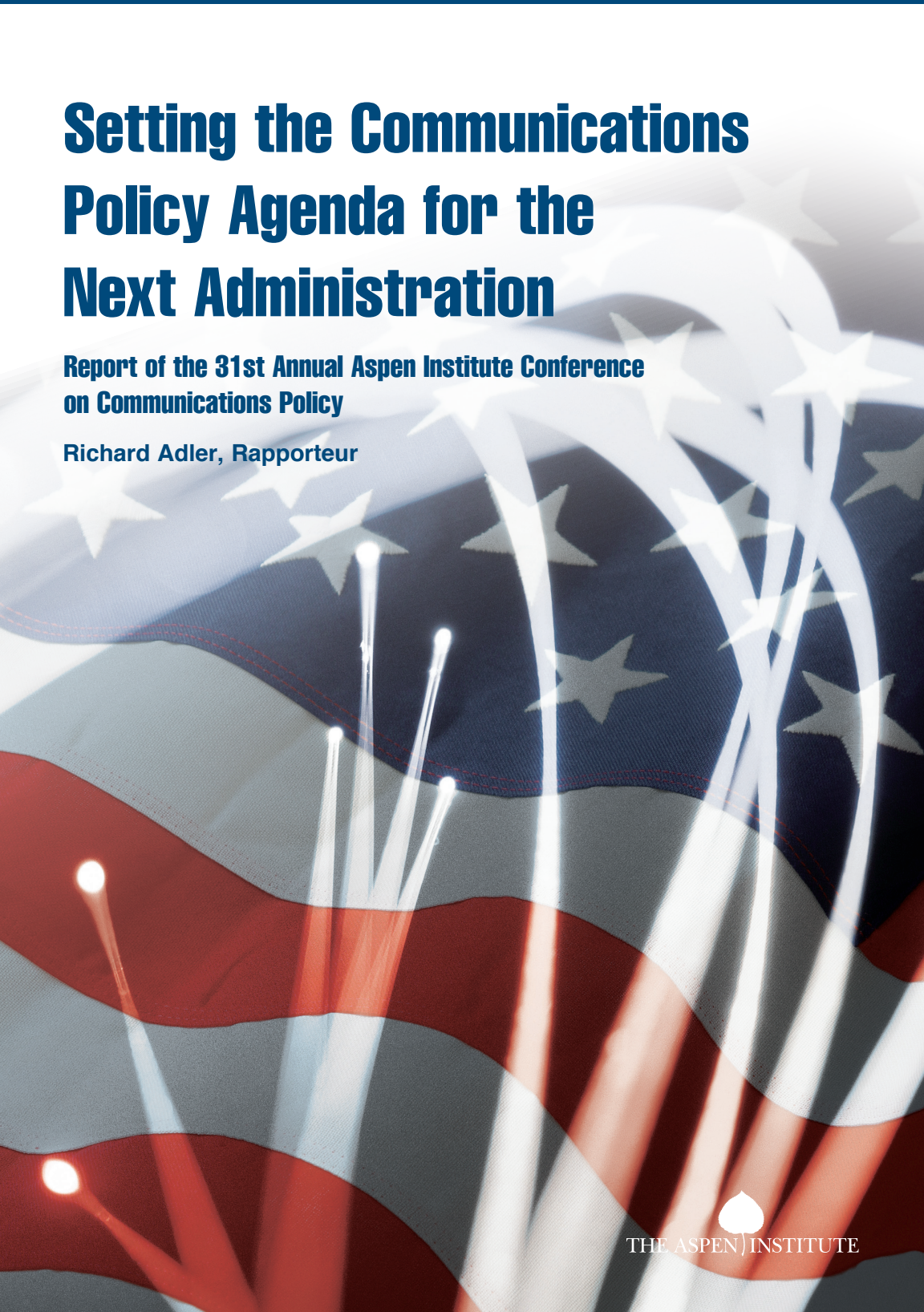
Setting the Communications Policy Agenda for the Next Administration

Report of the 31st Annual Aspen Institute Conference on Communications Policy

Richard Adler, Rapporteur



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Rapporteur

THE ASPEN INSTITUTE

Communications and Society Program
Charles M. Firestone
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Washington, D.C.
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This report is written from the perspective of an informed observer at the Aspen Institute Conference on Communications Policy. Unless attributed to a particular person, none of the comments or ideas contained in this report should be taken as embodying the views or carrying the endorsement of any specific participant at the Conference.

Foreword

In the past eight years, the telecommunications field has experienced a number of changes that have shaped the way consumers access and interact with technologies. During that time, the Obama Administration has sought to increase investment, build critical infrastructure, increase access to high-speed Internet connectivity, promote competition, expand access to spectrum, develop policies to safeguard consumers and leverage the Internet to promote other areas of public policy such as education, healthcare and democracy. As the next Administration takes power, it is unclear how it will design policies in these same areas.

On August 14-17, 2016, key decision makers from the telecommunications and information fields met in Aspen, Colorado at the 2016 Aspen Institute Conference on Communications Policy to explore areas where the next Administration should focus its efforts concerning communication policy. Essentially, it was time to reevaluate the National Broadband Plan and other related policies, whichever candidate was to win the Presidency.

After hearing a keynote talk from the sitting Chairman of the Federal Communications Commission, Conference participants compared the current communications landscape with the foreseeable future of the digital and broadband environment of 2020. They then considered contrasting approaches (Democratic and Republican) as to how governments have and should maximize the public interest in addressing the pressing communications issues of the day. Next, participants discussed some of the economic and technological events that could occur in the near future and how the next Administration might deal with these issues. Finally, the group suggested various strategies and action steps that the new Administration could take to promote the public interest in the coming four to eight years.

Recommendations include:

> **RECOMMENDATION 1. Promoting Inclusion and Expanding Opportunities.** Recognizing that there are a number of Americans who do not have Internet service or choose not to be connected, the Aspen conference participants recommended

three types of actions to overcome the persistent digital divide: expand access, address the problem of affordability, and spur adoption and use of broadband. This includes addressing the problem of inadequate investment in rural broadband by developing a "21st Century Infrastructure Bank" that could leverage funds currently raised for the Universal Service Fund to invest towards accelerating and expanding the deployment of communications infrastructure. Participants also called for improved marketing efforts for programs provided by major telecom providers that offer discount broadband access for low-income consumers.

RECOMMENDATION 2. Supporting Innovation and Infrastructure. Participants made specific recommendations in this area recognizing the need for the creation of more jobs, the importance of capturing lost opportunity costs of not making necessary infrastructure investments, and to solidify the U.S. as a global communications and technology leader. Recommendations included encouraging public/private collaborations, providing tax incentives for investments in infrastructure, continued efforts to provide additional spectrum, and the need for the U.S. government to protect innovation from international threats by developing a new White House Directorate of Trade and Competitiveness.

RECOMMENDATION 3. Building a Trust Environment. The final set of recommendations focused on addressing threats to cybersecurity and privacy. Recommendations included the development of an UL-like rating system for digital devices, software and networks that is easy to understand for consumers. Furthermore, the group recommended a blue-ribbon public-private group to understand what is happening in the field, identify gaps and recommend improvements for security. Participants also called for a unitary framework for privacy protection that is both comprehensive and comprehensible.

As in all of our Communications and Society Program roundtables, the rapporteur, in this case, Richard Adler, aims to make the issues accessible to the lay reader and reflect the insights and recommenda-

tions of the participants at the conference. The group did not take votes and many of the recommendations stemmed from individual working groups that met during the Roundtable. Accordingly, not every recommendation or statement reflects the views of all attendees or their employers rather they are the rapporteur's view of the general sense of the group.

Acknowledgments

I would like to acknowledge and thank the entities represented in this conference who have also contributed to the Communications and Society Program. They are AT&T, Charter, Cisco Systems, Comcast, Dodge and Cox, Emmis, Google, Intel Corporation, Ligado Networks, Microsoft, Netflix, New Street Research, Nielsen, T-Mobile USA, Vanu, Inc., Verizon, and The Walt Disney Company.

I also want to thank FCC Chairman Thomas Wheeler for his keynote presentation; Richard Adler, our rapporteur, for his extensive and informative account of the conference discussions; and our participants for their contributions to these complicated topics. Finally, I want to thank Dominique Harrison, Project Manager, for producing the conference and editing this report.

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January 2017

Setting the Communications Policy Agenda for the Next Administration

Richard Adler

31st Annual Aspen Institute
Conference on Communications Policy

Setting the Communications Policy Agenda for the Next Administration

Richard Adler

For the past three decades, each year the Aspen Institute Communications and Society Program convenes a conference on communications policy. Participants, including regulators and other policymakers along with scholars and representatives of communications companies and public interest groups, meet annually to address a specific issue and develop recommendations for constructive action around that issue.

The 31st Aspen Institute Conference on Communications Policy took place in the summer of 2016, prior to the Presidential election. Given this timing, it seemed appropriate for the conference to identify the key communications issues that will face the incoming administration and to propose promising approaches for dealing with those issues.

Providing a Back Azimuth

The conference opened with a speech by Federal Communications Commission Chairman Tom Wheeler who provided a perspective on the present state and the future challenges for communications policy. Noting that we are living in a time of network-driven "opportunity and reshaping," Chairman Wheeler pointed out that this is not the first time that Americans have had to deal with the impact of new technologies. He looked back to the introduction of two earlier technologies—the railroad and the telegraph—that "combined to make the mid-19th century a still unmatched period of network-driven upheaval" that involved "dislocation, disruption and despair" for many Americans. But he noted that this disruption generated creative responses—including the founding of unions and co-ops that empowered working

people, efforts to protect public health and public safety, and the rise of progressive political movements—that ultimately ensured that the benefits of the new technologies were widely shared. He suggested that this past experience can serve as a "back azimuth" to help chart a path from the present to the future.

…we are living in a time of network-driven "opportunity and reshaping"….
– Chairman Tom Wheeler

Wheeler then offered a framework for moving forward and identified five basic components of a "Network Compact" that define the "responsibilities of those that built and operated networks: access, interconnection, consumer protection, public safety, and national security." He suggested that these domains will continue to be important for the foreseeable future (the full text of Chairman Wheeler's speech is available at https://www.fcc.gov/document/wheeler-remarks-aspen-institute-communication-policy-conference).

The Current Environment

To provide additional context for the conference discussions, Kevin Werbach, Associate Professor at The Wharton School, catalogued the current tech environment and some of the associated policy issues likely to demand attention in the near future. The landscape he described is highly dynamic and marked by numerous disruptive forces.

Werbach began by pointing out the emergence of new network-based digital technologies and business models that are likely to challenge existing regulatory schemes. For example, while cable and cellular network operators are now the primary broadband access providers, new players and new business models are emerging that could challenge their dominance. Companies such as Google and Facebook, which have been largely exempt from traditional telecom regulation, are rapidly becoming access providers in their own right by investing in the development of nontraditional delivery channels, while OTT (Over-the-Top) providers are also creating new channels for content delivery.

And just as the large ad-supported platforms like Google and Facebook are becoming carriers, traditional telecom companies are moving into content, with Verizon acquiring AOL and Yahoo, and AT&T announcing its intention to acquire Time Warner, further shifting the boundaries between industry participants. One important decision for the new administration will concern its attitude toward anti-trust law and whether it intends to challenge such mergers.

Even as variable costs for digital communications (the price per bit transmitted) continue to fall toward zero, the question of how to price access to information remains problematic….
– Kevin Werbach

At the same time, entirely new forces are appearing. Supposedly neutral digital algorithms are becoming more powerful and pervasive, threatening to embody discrimination in new, more subtle forms and intrude more deeply into personal lives, requiring a rethinking of traditional approaches to protecting privacy. The blockchain distributed ledger (the basis for crypto-currencies like Bitcoin) will offer powerful capabilities that pose new regulatory challenges along with exciting opportunities for innovation. Meanwhile the openness of the Internet's architecture and of social media is raising difficult questions about the limits of free speech and the need to provide protections against malicious actors. And autonomous vehicles and the Internet of Things are creating new issues around safety and security related to the convergence of digital networks with real-world objects.

Amidst all this change, Werbach noted that some constants remain. Mobile traffic continues to grow at an exponential rate, driving a seemingly insatiable demand for more bandwidth for wireless communications. And the fundamental economics of networks continue to be anchored in the equation of high fixed costs (capex) and low variable costs (opex). Even as variable costs for digital communications (the price per bit transmitted) continue to fall toward zero, the question of how to price access to information remains problematic:

Does information want to be free or to be expensive? Depending on circumstances, the answer to both questions can be "yes."

In offering his prognostications for the future, Werbach noted that it is always difficult to escape the limits of our ability to look ahead. There are no "future facts," and it is always safer to look backwards than to look forward. For example, it can be misleading to simply project past trends into the future (one must be careful how one uses a back azimuth for navigation).

Issues related to timing are particularly tricky. For example, we seem to be finally reaching the limits of Moore's Law,[1] which has driven so much technological progress over the past half century. As a result, we might be "getting near the top of the technology curve" and entering a period of comparative stability. There will surely be a "next wave" at some point in the future, but is the next major "S-curve" that boosts the power of technology by another order of magnitude likely to happen in the near-term, or is it still a decade or more away? To what extent will 5G, the next generation wireless standard, due to be completed by 2020, be a game changer? How soon will we actually be riding in autonomous vehicles? Will humans be totally banned from driving cars within twenty years, as Elon Musk predicts, because they will be considered too dangerous?[2] Will developments in AI lead to systems that not only perform useful functions but that can truly rival human intelligence?

Others suggested that we may be at a point of broadly diminishing returns on technology, in which practical considerations like improving usability, affordability, efficiency and reliability will loom larger than increases in raw performance. An equally important question is whether demand for more bandwidth will follow past trends. The recent growth of wireless traffic, for example, has been largely driven by the popularity of high bandwidth streaming video on mobile devices. But will the emergence of the Internet of Things shift demand toward networks that can support large numbers of small, bursty transmissions from millions of connected devices? As homes become smarter and more automated, will they routinely generate more data than they consume, reversing the current pattern? Finally, as bandwidth increases, what new applications will emerge that we cannot now foresee?

Still, whatever tomorrow's "unknown unknowns" may be, today's "known knowns" related to telecom policy (e.g., the need for more

bandwidth for mobile communications, the transition to next generation 5G wireless networks, privacy and cybersecurity concerns) would seem to be sufficient to fill the agenda of any new administration. Among the big questions that will need to be addressed are:

- Are traditional approaches to regulation becoming outdated in a broadband Internet world or can they be adapted to accommodate new realities?
- Where does competition ensure robust markets and where is it lacking?
- What policies are needed to support private investment and to encourage continued innovation? Are there areas where public investment is needed?
- What telecom services are essential and which are not? Which services deserve to be subsidized?
- Does a single national goal to provide universal access to high performance communications (e.g., broadband or the latest-generation wireless service) still make sense, or should there be different goals or distinctive approaches for different environments (e.g., urban vs. rural areas)?
- Should more be done to accelerate the adoption and use of new technologies by individuals and by key industry segments? What might be done to expand inclusion in the ownership and control of key channels of communication?
- Is it time—20 years after the Telecommunications Act of 1996—to update telecom regulation? How feasible is such an effort? What can be accomplished within the existing framework?
- What needs to be done to ensure that the U.S. maintains global leadership in telecom and tech?

Approaches to Governance

How should government maximize the public interest in the regulation of communications? While both Democrats and Republicans are committed to achieving this goal, their ideas about what constitutes the public interest and what means should be used to pursue it differ in a number of ways. To stake out the contrasting views of the parties, and

to explore how much common ground may lie between them, representatives of the two parties laid out the key premises that help to shape their approaches to communications policy.

The Internet…is not evolutionary but revolutionary, bringing with it fundamental changes in our economic assumptions….

David Redl, Chief Counsel for Communications and Technology on the House Committee on Energy and Commerce, began by framing his perspective in two ways—generationally (he is a Millennial) and politically (Republican). He started by noting that his generation has grown up in a world shaped by the Internet, a world that is very different from one dominated by monopoly providers who needed to be carefully regulated. To illustrate the differences between generational experiences, Redl quoted his former boss at the CTIA-The Wireless Association, Steve Largent, who once remarked that "his own generation fought to have unlisted telephone numbers, while Redl's generation voluntarily puts their phone numbers on Facebook."

The Internet, which carries a large and still growing percentage of all electronic communications, is not evolutionary but revolutionary, bringing with it fundamental changes in our economic assumptions. Today, neither time nor distance is relevant in calculating the cost of communications (though, as discussed later, location, along with demographic factors like age and income, still influence access to communications capabilities). And as available bandwidth continues to increase and variable communication costs continue to fall toward zero, the need to count and charge for the number of bits sent and received may also disappear.

Redl argued that policymakers should approach the Internet as a unique entity and resist the temptation to fall back on older regulatory paradigms. History may be informative, but it is not dispositive. In a communications environment that is shifting, policymakers need to be willing to question old assumptions and embrace new ideas. For example, is the concept of a common carrier still valid in the Internet

age? Does the goal of reaching 100 percent broadband adoption need to be reconsidered when some households may not see a need for a fixed broadband connection? And what will happen when the next generation wireless standard, 5G, arrives and further blurs the line between wired and wireless communications?

In the midst of these questions, how should we move forward? Redl offered a simple formula: incent innovation, dis-incent regulation. Accept market decisions, even if they may not fit with one's preconceptions. Avoid deciding in advance what is acceptable, but try to understand and respond to changing circumstances. And recognize that rules need not be perpetual but can be time-limited or subject to being revisited and revised.

…"generational change means cultural change," which should be reflected in our approach to policymaking. – *Reed Hundt*

Speaking for the Democratic position, former FCC Chairman Reed Hundt agreed with Redl that "generational change means cultural change," which should be reflected in our approach to policymaking. The attitudes of Millennials are, in fact, completely different than those of earlier generations. They are much more pragmatic and less concerned with right and wrong; they believe in experimenting and making changes based on the results of those experiments; they value community over individual action; they are very tolerant and have a deep belief in equality, but they are unwilling to accept a "one size fits all" model of regulation. They are acutely aware that the standard of living has gone down for many, especially those near the bottom, and that economic inequality has increased substantially. Their bottom line is that government is broken and the way it works needs to change.

Like Redl, Hundt suggested that the fundamental problem of government is not too much partisanship (real as that may be) but the persistence of 18th century government in the 21st century. In fact, Hundt asserted that, "There is nothing about the structure of existing government agencies and departments that maps against the realities

of life today." In other words, there is a deep mismatch between the nature of many of the problems that need to be addressed and the mechanisms available to address them.

Beyond structural changes to the regulatory process—a long-term project that is not amenable to quick fixes—there are discrete policy areas that include but go beyond communications issues that remain high priorities for action for Democrats:

- Although the form that monopolies take today may be different than the past, the problem of monopoly power has not gone away and will need attention.
- The problem of economic inequality needs to be addressed. Increasing the minimum wage is one immediate goal. Making vital government services more widely available by digitizing them and putting them online is another potential lever for addressing inequality.
- Despite progress in increasing access to broadband, more needs to be done to move the number of households without broadband service to zero.
- Balancing the priorities of energy and the environment remains an urgent priority. Current policy is clearly out of date: Even though the "product" is identical everywhere, we continue to leave much regulation of energy to the 50 states. The Department of Energy is mainly concerned with atomic weapons, and the Federal Energy Regulatory Commission (FERC) is largely ineffective. Despite the crucial importance of energy policy, there is no equivalent of the FCC for energy in this country. What is needed is an agency with clear powers to deal with energy regulation.
- Finally, after years of stalemate, it is high time to deal with the problem of immigration. Sustaining economic growth depends on having an immigration policy that recognizes the value of attracting people who can contribute to this country's strength rather than focusing just on keeping out those who might be security threats. One question that needs to be asked is why is an enforcement agency (Department of Homeland Security or DHS) in charge of immigration policy? In a country that

has been built by immigrants, it would seem to make sense to address this issue strategically, not just defensively.

Karen Kornbluh, Executive Vice President for External Affairs at Nielsen, who also served as an advisor to the Clinton campaign, added that a Clinton administration's agenda would have a strong focus on promoting economic growth and inclusion, and on the role that government can and should play in serving the real needs of people. She confirmed several of the points Hundt made and added a few other issues that were identified as priorities for a Clinton administration:

- A major focus for policy should be on the needs of "Main Street"—ordinary citizens who have been left out or left behind by economic development and technology development trends.
- In terms of education and economics, every child should have an opportunity to learn computer science and have access to higher education. Other policies support the development of targeted "nanodegrees," the deferral of student loan payback for entrepreneurs, and providing flexible benefits for workers who change jobs frequently.
- Internationally, the free flow of information should be guaranteed.
- Government needs to work smarter to help citizens feel that government is efficient and accountable. The top citizen-facing government services should be updated and made easily available online.

Following these presentations, the conference participants contributed their perspectives, expressing support for or questioning some of the priorities or adding issues to the list of priorities.

FCC Commissioner Mignon Clyburn and Howard University PhD student and Guest Scholar Alisa Valentin both challenged the notion that "distance is dead" as a result of modern communication technologies. They both noted that there remains a large distance—both geographical and economic—between advantaged and disadvantaged regions of the country. In particular, Commissioner Clyburn asserted, there is a persistent gap between the availability of high speed networks in rural areas of the country compared to urban centers, and counties that are marked by "persistent poverty" (many of which are

rural)[3] typically have poor access to telecom services. Professor Allan Hammond of the Santa Clara University School of Law cautioned that more technology is not always the solution to every problem. In fact, indiscriminately pushing technology could actually widen the gap between the haves and have-nots of the country.

Rob Atkinson, President of the Information Technology and Innovation Foundation (ITIF) noted that the issue of economic inequality is actually quite complicated. Recent studies from credible sources (e.g., the Federal Reserve Bank of San Francisco and the Congressional Budget Office) indicate that while average wages have increased, median wages for full-time workers have also increased over the past eight years. While it is true that the largest gains have gone to the top earners, incomes have also risen for workers at the bottom.

The most important question…is how we can harness technology to increase productivity and be a reliable engine of prosperity. – ***Rob Atkinson***

The real cause of stagnant income for many, he suggested, is not the distribution of income but rather the historically slow growth in productivity, which is the most fundamental factor driving income gains. Over the last decade, productivity has increased only about 12 percent, compared with an increase of 34 percent in the 1990s. The average annual rate of productivity growth from 2007 to 2015 has declined to 1.3 percent, well below the long-term rate of 2.2 percent per year from 1947 to 2014. And for the first time that productivity data has been collected, the U.S. experienced a decline in productivity over three consecutive quarters.[4] The most important question, Atkinson concluded, is how we can harness technology to increase productivity and be a reliable engine of prosperity.

Kathleen Ham, Senior Vice President for Government Affairs at T-Mobile, added that "a lot of problems can be solved by healthy competition," and that supporting competition, which in turn spurs innovation, can obviate the need for regulation. However, she noted

that governments tend to like the status quo, which can diminish their commitment to promoting competition.

Joanna Shelton of Google noted that much of the rest of the world is tightening control over the Internet and other networks. For example, Europe is currently redoing all of its communications regulation with minimal public input. It is important that the U.S. serve as a counter to this trend by making sure that it protects the values of competition and innovation that have set this country apart from other countries. She cited the work nearly 20 years ago of Ira Magaziner, then a senior advisor to President Bill Clinton, on a "Framework for Global Electronic Commerce" that started from the premise that well-functioning markets are highly efficient allocators of capital, and that the Internet is "as close to an optimum market as we have seen."[5] Given that government should intervene only when there are market failures, Shelton argued that there is no compelling reason for the government to get involved with regulating the Internet. The U.S. remains a "shining example" for the rest of the world in supporting a free Internet—and it is important that it maintain that role.

…"a lot of problems can be solved by healthy competition," and that supporting competition, which in turn spurs innovation, can obviate the need for regulation. – ***Kathleen Ham***

FCC Chairman Wheeler raised a note of caution about offering any recommendations that called for an expanded role for the FCC without addressing the reality that overall funding for the Commission has been steadily declining in recent years. Budget cuts have led to the elimination of staff positions, including economists and engineers, with the result that the agency is currently operating with the lowest number of full-time employees in modern history. Wheeler noted that given that the message to the FCC from Congress has been for it to "do less with less," a larger role for the Commission would necessitate a reversal of this stance.

A New Telecommunications Act

The conference participants also considered the prospects for a major revision of communications law. It has been exactly two decades since the last major communications policy reform, the Telecommunications Act of 1996, was passed—a period of time that has seen enormous changes in communications technology. For example, that legislation barely mentioned the Internet and focused almost entirely on reforming regulation of local and long distance phone service. According to Kevin Werbach, "We've known for at least 15 years that the 1996 Act is out of date."

But enacting major new legislation is never easy. What allowed that legislation to pass was the development of a consensus that the existing law was preventing capital from going where it needed to go: local telephone companies needed to invest in long distance service and long distance companies needed to invest in local service. Is there some equally significant mis-allocation of capital today that would justify a new act?

Jonathan Chaplin, Managing Partner of New Street Research, pointed to the massive investment that will be needed to implement the next generation wireless standard, 5G. The new standard, which is currently under development and is scheduled to be fully specified in 2020, will bring dramatic increases in performance (higher speed, lower latency and greater capacity), but it will be disruptive in terms of blurring the line between wired and wireless communications. And because it will make use of very high frequency, short-range spectrum, 5G will involve the deployment of a vastly larger number of small cells to provide capacity where it is needed. Much of the infrastructure needed to support this denser network architecture does not exist.

It is estimated that upgrading current wireless networks and implementing 5G will require in excess of $100 billion in capital investment. If the current regulation regime represents a significant disincentive to making this investment, new legislation could be warranted. And David Redl added that capital allocation is not the only basis for justifying a new act. There is, he suggested, a growing consensus that the current law is simply inadequate to the needs of current society.

Kevin Werbach proposed three possible scenarios that might bring action to pass new legislation: first, an industry impasse that triggers

change (one possibility might be related to the transition from the traditional phone network to a pure IP environment, which could trigger worry about the treatment of stranded assets); second would be the occurrence of a crisis of the magnitude of 2008 or a "digital Pearl Harbor" that calls for a dramatic response; and third would be a "tectonic" election that rearranges the policy landscape and policy priorities in a major way, which may be where we are now.

THE NEXT TELECOM AGENDA: RECOMMENDATIONS

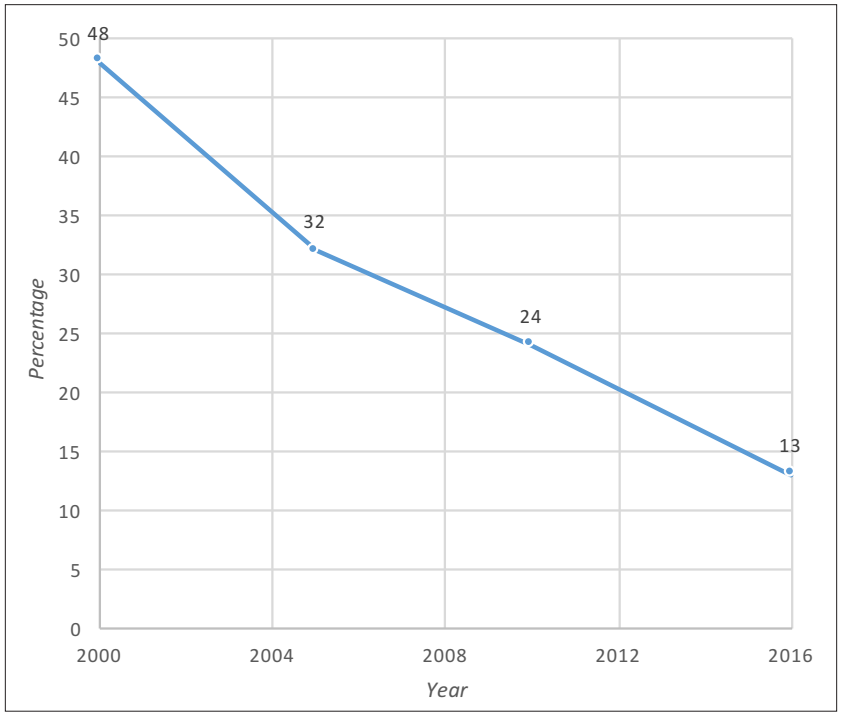
In identifying priorities for the next administration, the participants agreed to forbear from confronting the formidable challenges that would be involved with any attempt to enact broad telecom regulation. Instead they focused on issues that are already under active consideration or are likely to arise in the near future related to three main topics: promoting inclusion and expanding opportunities for all citizens; encouraging continued investment and innovation; and creating a trust environment online to protect citizen's digital lives.

RECOMMENDATION 1. Promoting Inclusion and Expanding Opportunities

The recommendations related to promoting inclusion and opportunities started from the premise that getting everyone online is not only important for individuals who may be left out of the digital economy, but also for society as a whole that benefits from having everyone connected and contributing online. In fact, Metcalfe's Law asserts that the value of a telecommunications network is equal to the square of the total number of users of that network, which suggests that investing in increasing online participation will pay a dividend to society as a whole and to everyone who is online.

The good news is that the U.S. has made steady progress toward digital inclusion. Between 2000 and 2016, according to the Pew Research Center, the percentage of Americans who do not use the Internet fell more than 70 percent, from nearly half of all U.S. adults to just 13 percent. Just from 2010, when the National Broadband Plan was published, the number of those offline fell by nearly half, from 24 percent to 13 percent.[6]

Figure 1. Percent of U.S. Adults Who Do Not Use the Internet, 2000-2016 (interpreted)



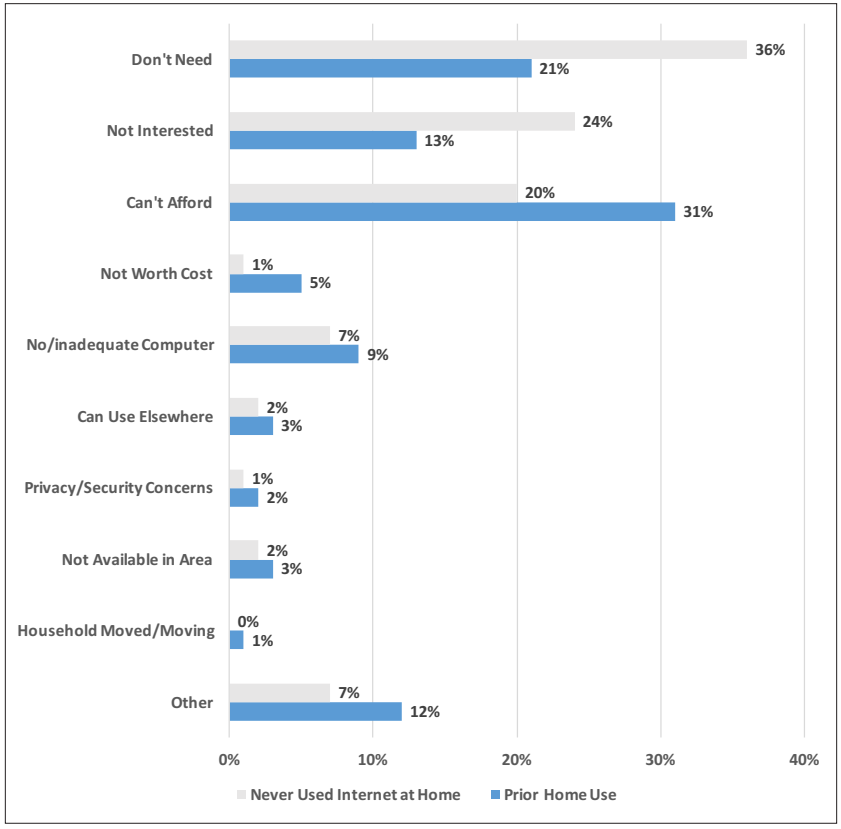
Source: Pew Research Center, www.pewresearch.org/fact-tank/2016/09/07/some-americans-I-use-the-internet-who-are-they/

And a great majority of American households are now linked to the Internet via fast broadband connections. In little more than a decade from 2000 to 2013, the percentage of American adults with access to home broadband grew from just one percent to 70 percent. However, data from the last few years suggests that this growth may have plateaued as some decide to forego traditional fixed broadband service for purely wireless service to either a smartphone or other connected devices.[7]

As these data show, the so-called digital divide has diminished over time, but it has not disappeared completely. While no one expects that broadband connectivity will ever reach 100 percent of households, other media have come close: In recent years, penetration of television and telephones (both wired and wireless) reached approximately 96 percent of households.[8]

Anatomy of the Digital Divide: Reasons for Non-Adoption. In order to understand the nature of the remaining gap, it is useful to look at the reasons that those who do not use the Internet at home give for not making use of it. A recent report from the NTIA's Office of Policy Analysis and Development presented data from a 2015 survey on "who's not online and why."[9] The report looked at the reasons given by both individuals who had never had Internet service at home and those who had it at some point in the past but do not currently have it.

Figure 2. Primary Reason for Non Internet Use at Home, 2015
(Percent of Households Not Online)



Source: National Telecommunications and Information Administration, https://www.ntia.doc.gov/print/blog/2016/digitally-unconnected-us-who-s-not-online-and-why

While lack of access to Internet service was originally a major reason for non-use, today only a few percent of those without home access to the Internet in 2015 cited lack of availability in their area as the reason for their non-adoption. However, there are some places in the country where lack of access—and particularly lack of broadband access—to the Internet is still an issue.

Another reason for deciding not to become a broadband user is affordability. The NTIA study found that one-fifth of those who had never had home Internet access cited cost as their primary reason for non-use, as did just over 30 percent of those who had access at some time in the past but did not currently have it.

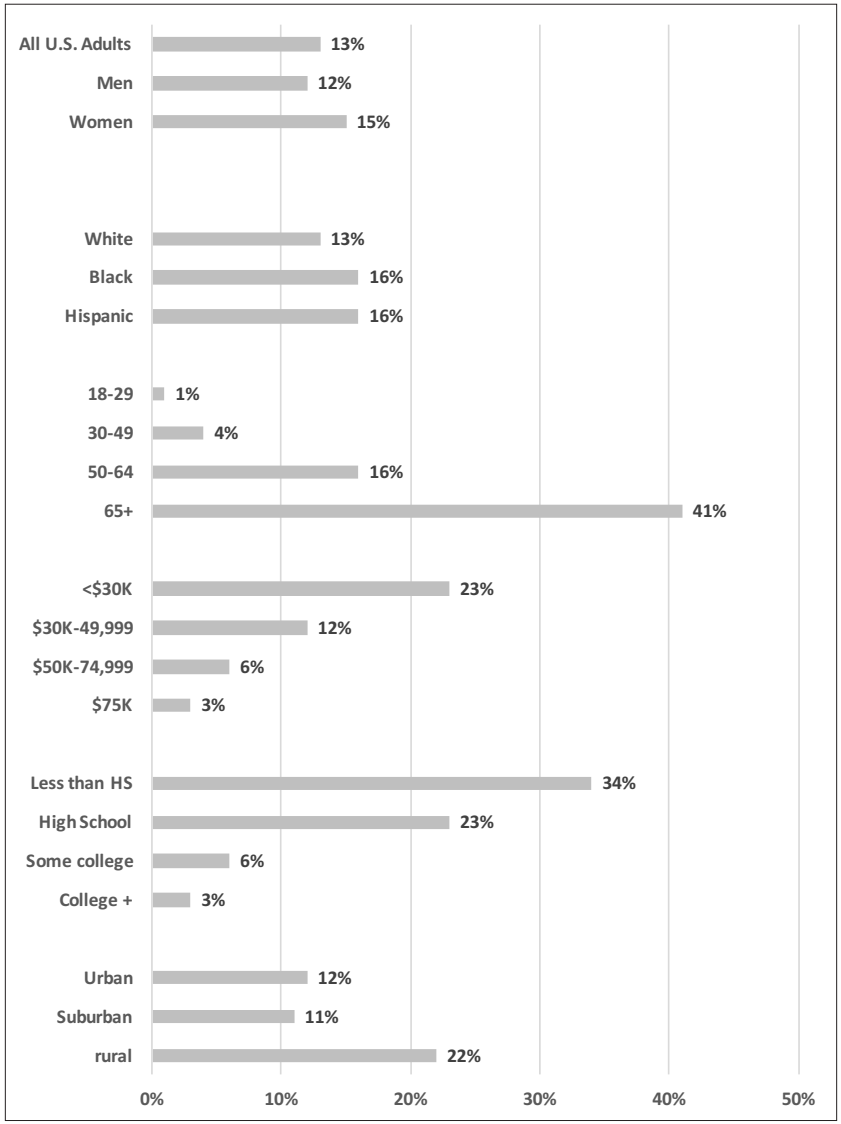
But the most important factor in non-adoption in recent years is the perceived relevance of the online content. More than half (60 percent) of people who have not had home access cited either lack of a perceived need or of a perceived interest in online content as their main reason for non-use. While a smaller portion of those who had previously had home access cited lack of need or interest (40 percent), the two factors combined still were more important than cost.

Demographics of Non-Adopters. It is also useful to look at who, demographically, tends to be non-adopters. According to a 2016 report from the Pew Research Center, just 13 percent of adult Americans do not currently use the Internet at all. This figure is well below the 48 percent of American adults who did not use the Internet in 2000, but it has stayed steady for the past several years.

Current non-users tend to be:

- ***Older***—41 percent of those over age 65 are not online compared to one percent of 18-29 year olds and four percent of 20-49 year olds;
- ***Lower income***—23 percent of those with annual incomes under $30,000 are offline compared to six percent or less of those with incomes of $50,000 or higher;
- ***Less educated***—34 percent of those with less than a high school education are not online compared to six percent or less of those with at least some college;
- ***Rural***—22 percent of rural residents are offline compared to 12 percent of urban dwellers.

Figure 3. U.S. Adults Who Do Not Use the Internet
(Percent of U.S. Adults who are Non-Users by Category)



Source: Pew Research Center, www.pewresearch.org/fact-tank/2016/09/07/some-americIdont-use-the-internet-who-are-they

Figure 4. Americans without Access to Fixed Broadband Service by Region and by Speed

	Population (millions)	Percentage of population without access at 25Mbps/ 3 Mbps	Percentage of population without access at 10 Mbps/ 1 Mbps	Percentage of population without access at 4 Mbps/ 1 Mbps
United States	33.98	10%	6%	5%
Rural Areas	23.43	39%	25%	19%
Urban Areas	10.55	4%	2%	2%
Tribal Lands	1.57	41%	N/A	N/A
Rural Areas	1.29	68%	N/A	N/A
Urban Areas	0.28	14%	N/A	N/A
U.S. Territories	2.62	66%	N/A	N/A
Rural Areas	1.07	98%	N/A	N/A
Urban Areas	1.55	54%	N/A	N/A

Source: Federal Communications Commission, https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2016-broadband-progress-report

While the use of the Internet has grown steadily among all of these groups, the gap between different demographic groups has persisted for many years. For example, while Internet use among those over age 65 has increased from 14 percent in 2000 to 58 percent in 2015, the gap in usage between seniors and younger people has remained, and the same is true for income and educational levels and for urban/rural residents.[10]

The geography of non-adoption. According to FCC Commissioner Mignon Clyburn, there are 353 counties in the U.S. that are identified as being marked by "persistent poverty"—that is, counties in which 20 percent or more of the population have lived in poverty over the last 30 years.[11] The large majority (301 counties or 85 percent) of these persistent-poverty counties are non-metro, and they represent 15 percent of all non-metro counties. Persistent poverty also demonstrates a

regional pattern, with nearly 84 percent of persistent-poverty counties in the South, comprising more than 20 percent of all counties in the region. Demographically, these counties have populations that tend to be poorer, less well educated and older than the U.S. population as a whole, and therefore tend to have lower rates of broadband adoption and use.

Given the different reasons that non-adopters have for not being online, the Aspen conference recommended three types of actions to overcome the remaining digital divide. The first is intended to *expand access* in places that still lack access. The second focuses on *the problem of affordability* and included several specific recommendations to increase the effectiveness of the federal Lifeline program, and also to encourage greater state-level innovation in this area. The third set of actions is intended *to spur adoption and use* of broadband, particularly among those who do not see the Internet as relevant to their needs, by expanding and improving the online availability of government services of particular interest to current non-adopters.

Expanding Access. Lack of access to broadband service is mainly a rural issue as illustrated in the following chart:

The magnitude of the divide depends on the definition of broadband service, with a larger gap existing with higher speed broadband as the criterion. But even when broadband is defined as 4Mbps/1 Mbps, a gap still exists between urban and rural areas: while 95% of the total U.S. population has access to broadband service under this definition, just 81% of rural residents do.

To help the country's rural areas to close the digital divide, the FCC provides funds to bring broadband to areas that current lack access to it. In 2014, the FCC created the Connect America Fund (CAF) by modifying its existing High Cost Fund to focus more directly on expanding broadband access. It provides up to $20 billion over a five year period to subsidize the cost of broadband in rural areas where it is not available or is available only at low speeds. An auction mechanism awards CAF funds to bidders that offer to provide service at the lowest level of support.

The Newest Threat to Rural Kansas: Lousy Internet Access

A news story in the *Wichita Eagle* in October 2016 focused on the problem of inadequate Internet access in Allen, a small town in rural Kansas. The article profiles Christianne Parks, a 19-year old resident of Allen, population 177, who believes that "if rural Kansas can't keep up with the Internet, she's probably out of here. 'Eventually, I probably would get bored out of my mind and leave.'"

The article notes that 81 of Kansas's 105 counties have lost population since 2000, with the ten counties with the steepest declines averaging losses of 20 percent, and concludes that "the trend is expected to worsen if Internet service to rural areas isn't improved." The article takes note of the Connect America Fund which is intended to subsidize rural broadband service, but quotes critics who fault the program for being too complex and involving too much red tape, which represent barriers to participation in the program, particularly for small, rural telephone companies.[12]

Even though the amount of money provided annually by the Connect America Fund (CAF) to improve rural broadband is substantial, it is probably not sufficient to fully close the connectivity gap between urban and rural areas. And deploying the next generation of broadband networks, including fiber optics for fixed access and 5G technology for wireless broadband, will require a massive amount of capital.[13] Since investors will focus first on areas where demand is greatest—typically urban areas with the densest concentration of people and business enterprises—it is possible that the gap between urban and rural America will widen further rather than narrowing as new technologies continue to be introduced.

Infrastructure Bank. To address the problem of inadequate investment in rural broadband, some of the Aspen conference participants proposed that the next administration create a "21st Century Infrastructure Bank." This bank could leverage funds that currently go into the Universal Service Fund (USF) to raise a much larger amount of capital that could be directed toward accelerating and expanding deployment of next-generation communications infrastructure that

would serve all Americans. Under this proposal, the Infrastructure Bank would issue bonds that would be funded by current USF receipts and could be guaranteed by the Federal Reserve to ensure that the bonds would carry the lowest possible interest rate.

The money raised from these bonds would be distributed by an auction mechanism similar to that currently used for the CAF and would award funds to market participants who offered to provide the most pervasive infrastructure deployment at the lowest cost. The companies that received these funds would own the infrastructure they build and would be responsible for ongoing operating and maintenance expenses. In return, they would be required to offer service to customers in perpetuity at a regulated wholesale rate. In order to win the funds, participating companies would have an incentive to contribute their own capital to deployment, which would have a multiplier effect for total capital investment.

Assuming that the $4.5 billion annually allocated for the Connect America Fund is used, this amount could raise approximately $89 billion for 30-year bonds that would carry a 3 percent interest rate. If the bonds carried an interest rate of 1 percent, the amount that could be raised would grow to $117 billion.

An alternative source of funds would be a tax on the repatriation of cash held abroad by U.S. corporations—an issue that was raised during the 2016 presidential campaign. With an estimated $2.1 trillion in foreign earnings being held overseas, a one-time offer to repatriate this money with a tax rate of 10 percent would raise $210 billion that could also be used to fund a 21st Century Infrastructure Bank.

Several participants raised legal and policy concerns about the proposal, notably the extent to which the fund would subsidize a single company's broadband deployment in areas that might be served by commercial providers without government subsidy. Potential unintended consequences could therefore include providing support for a monopoly service model, reducing private sector investment, chilling innovation and reducing jobs.

Improving Affordability. The second component of increasing adoption and use of services involves addressing the problem of affordability, which represents the primary reason for non-adoption for approximately one-fifth to one-third of those who are not currently

online. Established in 2008 as part of the USF, the federal Lifeline program provides subsidies of up to $10 per month for either landline or cell phone service for Americans with annual incomes below 135 percent of the poverty line. In 2015, the Lifeline program provided 13 million households with $1.6 billion in subsidies. As of December 2016, these subsidies can also be used to pay for broadband services. In addition, a number of major telecom providers have launched programs that offer broadband access at a discount to low-income customers.[14]

Noting that Lifeline programs tend to carry a certain amount of stigma from the need to rely on a subsidized service and are often not effectively promoted, the Aspen conference participants called for improved marketing efforts that would de-stigmatize and normalize participating in these programs by making them more attractive, perhaps by using similar techniques to those that companies use to promote their commercial offerings. Since Lifeline programs are offered on a state-by-state basis, greater innovation and experimentation at the state level in how these programs are packaged and marketed should be encouraged.

Increasing Adoption. Today, the biggest obstacle to getting everyone online is neither lack of availability nor affordability of broadband, but rather a lack of interest. Some people feel that they simply do not want or do not need to be online. According to the 2015 NTIA survey, more than half of all non-adopters cited this as their main reason for not being online.

As noted previously, non-adopters tend to skew toward being older, poorer and less well educated—all groups that tend to be make use of multiple government services. Therefore, one way to encourage usage by non-adopters would be to make sure that government services that are relevant to these groups are online and easy to access and use.

There are already a number of mandates for government agencies to make their services available online. But to provide non-adopters with more motivation to get online, it would be helpful to identify and prioritize the development of services that are of greatest value to them. In an op-article in *The Washington Post*, Blair Levin and Larry Downes, who helped to frame this recommendation at the Aspen conference, identified some of the specific government apps that would be most relevant to key groups of non-adopters:

> For older Americans, [high-value applications] include one-stop shopping for information about Social Security, Medicare and tailored services, such as telehealth. For rural users, as well as those with less education, key services are those that help with both education and employment: matching résumés with openings, signing up for vocational education for in-demand positions and financial aid. Health insurance and child welfare services are also critical.[15]

It is true that the government has not been particularly adept at creating online applications that are appealing and easy to use, with the problems encountered with the launch of healthcare.gov perhaps the most egregious example.[16] But the government seems to be making a conscious effort to make its services more available online and to develop effective, user-friendly applications.

For example, data.gov was established in 2009 to make valuable government-created information more available. Starting with 47 datasets, the site now provides access to more than 190,000 datasets. In 2014, in the wake of the problems encountered in the development of healthcare.gov, the General Services Administration created 18F, a small group within GSA that uses lean start up methods and open source software to build digital applications for government agencies. Also in 2014, the White House launched the U.S. Digital Service as a "start-up to pair the country's top technology talent with the best public servants to improve the usefulness and reliability of the country's most important digital services."[17] Initiatives like these, which bring skilled people and resources from the private sector into government, could be helpful in developing apps that address the needs of non-adopters.

To support these kinds of efforts, it would also be useful to review and reform procurement rules that make it difficult for government to recruit first class talent, and too often act as a straightjacket that stifles innovation. To further stimulate innovation, government agencies could use the operational savings generated by putting services online to establish venture funds that could invest in development of useful new applications.

For non-adopters, putting government content and services online, by itself, may not be sufficient. Low-income families may also need an access device, while others (like seniors) may need training and support

designed specifically to help them learn to use an unfamiliar technology, all of which may require separate funding.[18]

Finally, to raise awareness of the potential of new communications technologies for local communities and the value of putting government services online at all levels, it would be useful to create a "PCAST for Mayors," modeled after the President's Council of Advisors on Science and Technology (originally created by President George H.W. Bush and continued by each subsequent president). This new council could bring together leading scientists and engineers to make recommendations on a wide range of issues related to science and technology. A similar resource would provide expert advice on technology to local leaders. Such a body could be sponsored by the National League of Cities or the U.S. Conference of Mayors, which focuses on larger cities.[19]

Painting a Vision

Beyond promoting greater access, affordability and adoption of new telecom services in order to close the digital divide, there are actions that the government can take to encourage wider use of these networks, among not only "disadvantaged" groups but those that stand to benefit greatly from the use of new telecom-based technologies. The National Broadband Plan (NBP), mandated by Congress and released by the Federal Communications Commission in 2010, made an important contribution to raising awareness of the importance of broadband and provided a "roadmap" for extending high performance Internet access to all Americans.

Former FCC Chairman Reed Hundt commented that the Plan was "an exemplary blueprint" that was based on extensive outreach and coalition building to develop a consensus around its recommendations. Hundt also pointed out that the plan is relatively unique in articulating a broad vision that identified an important national priority, and providing specific recommendations for actions to realize that vision. Unfortunately, an unexpected development occurred just two weeks after the Plan was released—a court decision was announced that invalidated the FCC's net neutrality rules and calling into question the Commission's authority to regulate broadband.[20] According to Blair Levin, who was the lead author of the NBP, dealing with this set-

back became a major preoccupation for the Commission that sharply reduced attention given to the NBP.

As Rob Atkinson, Founder and President of the Information Technology and Innovation Foundation, noted, the Plan did not just discuss the technology but also explored the larger ecosystem that broadband supports. The final section of the Plan, "National Purpose," describes the potential of broadband to improve performance in, even to transform, seven key sectors of the society [Health care, Education, Energy and the Environment, Economic Opportunity, Government Performance, Civic Engagement, and Public Safety]. It also proposes strategies for encouraging faster adoption of the technology in each of them.[21]

The Aspen conference recommended that a new administration sponsor a "quick update" of the National Broadband Plan, and particularly of these "National Purpose" sections to reflect how technology has evolved since 2010. For example, gigabit-speed broadband is now available in a number of communities; self-driving vehicles are beginning to operate on the street; the Internet of Things has begun to take shape; and there is greater awareness today of 5G, the next generation wireless standard. The update could reconsider the impact that these evolving capabilities will have on key aspects of our society and our economy. For example, a discussion of healthcare would provide an opportunity to highlight the rapidly growing usefulness of telemedicine and remote patient monitoring, while the section on energy and the environment would be a way to explore the potential for a smart electrical grid and the value of distributed generation. The section on economic opportunity could address the impact on the future of work and employment of rapidly evolving technologies like artificial intelligence, robotics and matching platforms like Uber.

Once an update of the Plan is completed, the results could be "taken on the road" through a series of regional meetings that would highlight the potential of broadband to stimulate innovation and growth. The goal would be to inspire broader engagement in preparing for a digital future that is already arriving and that has real consequences for many sectors of society. One powerful message that an updated plan could deliver is that communities that most rapidly deploy a high-performance broadband infrastructure will have a competitive advantage in

attracting businesses and perhaps even individuals who want to live and work in high-connectivity environments. Such a message could stimulate local competitions that would accelerate the development and deployment of a broadband infrastructure.

A question that participants debated but did not resolve was where this update should be based. On the one hand, the FCC was the place where the original NBP was created and would therefore be a logical place to host an update. On the other hand, having the White House take responsibility for the update would potentially give it more prestige and greater visibility. It would also be an appropriate place for dealing with cross-cutting issues that go beyond the purview of the FCC. The downside of White House sponsorship would be the possibility that the effort could get insufficient attention and resources as a result of multiple competing priorities.

Another plausible home for the update would be the Broadband Opportunity Council, which includes representatives from 25 federal agencies and departments and is chaired by the Departments of Commerce and Agriculture. The Council was established by President Obama in 2015 with a mandate to identify ways to better support communities seeking investments in broadband and to recommend actions to remove barriers to broadband deployment and use.[22] As FCC Chairman Wheeler noted, both the NBP and the Broadband Opportunity Council have a shared goal of raising public awareness of the importance of broadband. Yet another alternative would be to house an update at the National Telecommunications and Information Agency (NTIA), the agency that is principally responsible for advising the President on telecommunications and information policy issues. But wherever this effort is housed, Congress, which might be called on to appropriate funds for the update, should be enlisted to support the effort.

Promoting Full Participation in the Digital Economy

While there are important benefits to getting all Americans online, just "making everyone an Internet consumer" is not sufficient to ensure full participation in the digital economy. A final set of recommendations related to inclusion focused on policies to expand economic participation in the telecommunications industry, especially for dis-

advantaged groups who have historically been excluded from such opportunities.

Fortunately, new tools are available to help accomplish this goal. For example, the SEC, at the direction of Congress, introduced new rules in 2015 that permit equity-based crowdfunding of entrepreneurial ventures by exempting smaller ventures from many of the rules that govern stock offerings.[23] But more needs to be done to widen access to deal flows for small businesses and individuals. Creating mechanisms to bring in new investments could be a win-win opportunity. At the same time that such a strategy would expand participation, benefitting groups previously excluded from the marketplace, it would also provide new capital to fund telecom infrastructure in places where it might not otherwise be deployed (including locations that have not been a priority for major providers to pursue). To accomplish this goal, the Aspen conference recommended a combination of carrots and sticks.

…"making everyone an Internet consumer" is not sufficient to ensure full participation in the digital economy.

The biggest stick that the FCC has to promote the full deployment of wireless facilities for which it has granted licenses is its build-out requirements.[24] The Commission has not been very strict in enforcing this provision to date, however. If it were to begin to do so, it could encourage greater use of spectrum that is currently underused in places like rural or tribal areas. And stricter enforcement could be coupled with a "carrot" that would provide incentives for holders of unused spectrum to make a deal with a small business such as a recognized Disadvantaged Business Enterprise (DBE) that would take responsibility for building it out in underserved locations. To encourage spectrum holders to make such deals, they could be given a bidding credit for future spectrum auctions, a tax credit, or a tax deferral.

RECOMMENDATION 2. Supporting Innovation and Infrastructure

The second group of recommendations have the goal of spurring innovation and investment through initiatives that create jobs, capture lost opportunity costs of not making necessary infrastructure investments, and solidify U.S. global communications and technology leadership. The recommendations are framed to encourage public/private collaborations, to maximize existing resources and to encourage efficiencies, and support inclusion and expanded access.

RAMPIT. The first recommendation intended to spur innovation calls for the creation of a new public-private partnership to sponsor basic scientific research on advanced wireless and other technologies. Somewhat facetiously given the name, the Advanced Research Project for Mobile Platforms and Information Technology, or "ARMPIT," this new research organization was described (non-facetiously) as a "Bell Labs model for the 21st Century" to be funded with a portion of the proceeds from the government's spectrum auctions. On reflection, we will rename it, more accurately, as the Research Alliance for Mobile Platforms and Information Technology, or RAMPIT.

One potential initiative for RAMPIT would be to fund a 5G Test Cities program that would establish labs in one or more cities where 5G technologies could be deployed for evaluation in a real-world environment. (In July 2016, the Obama administration announced an Advanced Wireless Research Initiative that included $85 million, including $50 million from the National Science Foundation, to design and build four city-scale wireless testing platforms.[25])

…because of the wide impact of broadband on many sectors of society, externalities from broadband investments generate societal rates of return that exceed private ones.

Tax Incentives for Infrastructure Investments. The group also recommended providing tax incentives for investments in infrastructure. They based this on the premise that because of the wide impact of broadband on many sectors of society, externalities from broadband

investments generate societal rates of return that exceed private ones. Therefore, without some form of stimulus, investments in telecom infrastructure and innovation are likely to be less than optimal. One option to promote critical investments in high cost (e.g., rural) areas would be to offer a 20 percent tax credit for investments in unserved or underserved areas. Another incentive would be to allow accelerated first year expensing of capital investments in next-generation network infrastructure.

Spectrum and Mobile. Another critical ingredient to support continued innovation and investment, beyond sufficient capital, is ensuring the availability of enough spectrum for wireless communications. The FCC's recent Spectrum Frontiers decision, which opened nearly 11 GHz of spectrum above 24 GHz for mobile use, was an important first step.[26] But more needs to be done to meet the seemingly insatiable demand for wireless communications. The Aspen conference called for continued efforts to provide additional spectrum, both licensed and unlicensed, for both mobile and fixed uses, particularly in the high frequency millimeter wave (mmW) bands that will be vital to next generation 5G networks. This will certainly involve action to more free up federally controlled spectrum and development of new models for spectrum sharing.

Other needed initiatives to ensure the timely and cost-effective deployment of new infrastructure will include action on multiple levels to accelerate the deployment of what will be a much larger number of small 5G cell sites that make use of high capacity, short range millimeter-band (mmW) spectrum and that may cover areas as small as a single room. This will involve setting rules for access to utility poles and rights of way and to buildings, and streamlining—or possibly preempting—local permitting processes and/or setting deadlines to ensure timely decisions on cell siting. Another important policy step often recommended in the past but not fully implemented, is a "dig once" rule that would ensure that when roads are built or repaired or when other construction projects take place, they will make provision for installing conduits that can be used to carry wiring for telecom in order to preclude the need for repeated excavations for this purpose.

To advance these proposals, the group called for passage of federal legislation like the Mobile Now Act, which includes a dig once man-

date, a shot clock for decisions on siting applications, a mandate to make additional spectrum available for commercial use, and incentives for innovations that would improve spectrum efficiency.[27] The bill was introduced in the Senate by Senator John Thune (R-SD) in February 2016, and received unanimous approval from the Commerce Committee in March, but had not been passed by either house as of this writing.

International. Finally the group called on the U.S. government to act decisively to protect continued innovation and confront a new wave of international "neo-mercantilism" designed to give foreign competitors an unfair advantage over American firms. This would include creating a new White House Directorate of Trade and Competitiveness as part of the National Security Council's International Economics team. This new group would be responsible for identifying and directing the use of all agencies' foreign policy tools against emerging free trade threats, and author/execute on a broader strategy to solidify market-based approaches in global trade deals and relationships. For example, the Directorate would coordinate cross-agency efforts to ensure that emerging international standards do not disadvantage U.S. companies in the global market.

RECOMMENDATION 3. Building a Trust Environment

The third and final set of recommendations focused on actions to address the continuing challenges posed by threats to cybersecurity and privacy. In introducing these recommendations, Aspen Institute Communications and Society Program Executive Director Charlie Firestone noted, with some understatement, that "cybersecurity is thorny." In fact, it is a topic that has come up with some regularity in previous meetings without any definitive resolution.[28]

One could argue that the cybersecurity landscape has become progressively less secure over time, despite all the efforts to bolster it. Large-scale cyber-attacks seem to occur almost continuously. Just in 2016, victims of major intrusions included the Department of Homeland Security, the Commission on Elections, Cox Communications, Apple Health Medicaid and, probably, most notoriously, the Democratic National Committee, which has been attributed to Russians. In mid-October, a massive denial of service attack that made use of a botnet

that included many lightly protected connected devices such as webcams, thermostats and baby monitors caused a widespread day-long disruption of online businesses such as Twitter and Spotify both in the U.S. and abroad. And just before Christmas 2016, Yahoo announced that a security breach that happened in 2013 had compromised personal information from more than one billion accounts, making it the largest breach to date, affecting twice as many accounts as a 2014 attack that it had reported earlier in the year.

The increase in the frequency and intensity of these incidents raises the specter of an even more disruptive event that causes so much damage that users (which is now almost all of us) become sufficiently scared that they avoid going online. In fact, just before the election, a report from the consulting firm Forester predicted that the new President would likely face a major "cybercrisis" within the first hundred days of taking office.[29] There are also separate reports that the U.S. has been developing plans for an offensive cyber counterstrike if there were an attack on U.S. assets deemed sufficiently serious to warrant retaliation.[30] This would raise cyber conflict to a new level of intensity.

An urgent need to find ways of rebuilding trust between industry and the U.S. government…will require an unprecedented level of openness and collaboration….

Looking farther ahead, it is possible to foresee even more dire challenges as the world of bits converges with the physical world, raising the prospect not simply of the hacking or theft of digital assets but the possibility of the disruption of connected devices ranging from implanted medical devices to autonomous vehicles.[31]

The group recognized that in a post-Snowden world, security and privacy threats are no longer confined to just the tech sector but now reach virtually every individual and every sector of the economy. It also noted that as U.S. industry "locks itself down" with end-to-end encryption to defend against cyber threats, it runs the risk of isolating itself globally, while the government could lose access to information

important for national security. This conflict is graphically illustrated by the FBI's struggle to get Apple to unlock the iPhone that belonged to the shooter in San Bernardino.

Events like this suggest a substantial divergence between the perspectives of the public and private sectors toward security. The Aspen group saw an urgent need to find ways of rebuilding trust between industry and the U.S. government, which will require an unprecedented level of openness and collaboration on the part of government as well as the private sector. Some efforts, such as those dealing with topics like encryption, may require multi-lateral consensus-building internationally. The goal for all parties is to build a "trust environment" that will allow all users to feel safe in accessing online resources.

The goal for all parties is to build a "trust environment" that will allow all users to feel safe in accessing online resources.

The Aspen recommendations focused on improving both cybersecurity and privacy. The group identified actions that the government should take—particularly steps to clarify potentially conflicting roles and identify both gaps and redundancies—and initiatives within the private sector. It also addressed "the government/industry interface," which includes opportunities for more effective cooperation between the two sectors.

In addressing these two issues, the group acknowledged the widespread perception that they are mutually exclusive—that is, improving security inevitably involves compromising privacy. Some questioned the accuracy of this perception. For example, Marjory Blumenthal of RAND proposed that "strengthening security is necessary but not sufficient for protecting privacy," but from a practical point of view, the two issues should be addressed separately.

Cybersecurity. There is a long history of attempts to develop effective responses to security challenges that includes both public and private sector initiatives (see sidebar).

Public and Private Sector Cybersecurity Initiatives

The "Rainbow Series." In the 1980s and 1990s, the National Computer Security Center, which is part of the NSA, issued a series of guides intended to promote good security practices in the private sector by defining criteria to evaluate and certify "trusted systems." The Rainbow Series (so-called because of the different colors of the covers of the documents) included "The Orange Book," which contained evaluation criteria for computer systems, and "The Red Book," which provided criteria for trusted networks. Unfortunately, the criteria defined in the series did not work well in practice: the highest tier of security was nearly impossible to attain, and even the lower tiers were difficult to meet.

Common Criteria. The Rainbow Series has been largely supplanted by the Common Criteria (CC), an international set of standards for computer security certification. The criteria enables vendors to assure the security of their products based on a standardized process of evaluation and certification. Certification does not guarantee security but does guarantee that claims made about the security of various products have been independently verified.

In participating countries, CC certification is provided by government-approved testing laboratories. In the U.S., the National Institute of Standards and Technology (NIST) accredits Common Criteria Testing Laboratories. To date, more than 1,000 products are CC certified, including biometric systems, databases, smart cards, operating systems and trusted computing devices. See *https://www.commoncriteriaportal.org*.

PPD-41. In July 2016, President Obama released a Presidential Policy Directive (PPD) focused on United States Cyber Incident Coordination. The directive was designed to improve coordination of government responses to "significant" cyber attacks. The PPD assigned lead roles to the Department of Justice in investigating attacks, the Department of Homeland Security for asset protection, and the Office of the Director of National Intelligence to lead intelligence support activities. The directive also codifies a severity scale (0 to 5) to quantify the seriousness of an attack and establishes a new Cyber Unified Coordination Group to ensure

that responses are properly coordinated. See *https://www.whitehouse.gov/the-press-office/2016/07/26/presidential-policy-directive-united-states-cyber-incident.*

There are also several non-governmental technical groups in the U.S. that could contribute to defining and promoting good security practices:

CA/B. The CA/Browser Forum, founded in 2005, is a voluntary group of certification authorities (CAs), vendors of Internet browsers, and others. The CA/B Forum provides certificates that verify the identity of Internet domain owners and supports efforts to improve the security of Internet users. See *https://cabforum.org.*

NANOG. The North American Network Operators Group is a professional membership organization for Internet engineering, architecture and operations. Members include carriers, content providers, hosting and cloud companies, data centers and interconnection service providers. The group's goal is to improve "the technologies, practices and facilities that make the Internet function," which includes improving security. See *https://www.nanog.org.*

BITAG. The Broadband Internet Technical Advisory Group provides a forum for discussing technical issues related to the operation of the Internet. The group takes up issues in response to a member or non-member request or in response to a request from a government agency such as the FCC. In June, 2016, the group announced that it was initiating a study of privacy and security issues related to the Internet of Things. See *https://bitag.org.*

In some areas, the private sector can and should take the lead. Industry groups such as the CA/B Forum, NANOG and BITAG could identify and promote best practices for cybersecurity and support their implementation by their member organizations and beyond. The 2016 Aspen participants suggested one specific strategy for improving security that has been proposed for many years:[32] develop a "UL-like" rating for digital devices, software or networks that can convey their security quality in a relatively straightforward way. One obvious candidate for this kind of certification is the rapidly growing number of

consumer-oriented connected smart home device such as webcams and thermostats that are known to be highly vulnerable to outside attacks.[33]

However, participants noted that the UL model is not a perfect fit for dealing with cybersecurity. One major issue is the money and time required to get a digital product certified, especially when certification is typically provided only for a specific version of a hardware or software product, and any change introduced in a new version, however minor, typically requires re-certification. Secondly, no certification can provide complete assurance of security. It can only guarantee that a product conforms to security protocols that assume a given set of circumstances that may not anticipate all threats. (In fact, hackers routinely attempt to exploit previously unknown vulnerabilities that, by definition, are not subject to prior testing and certification.)

While the private sector has an important role to play, the government has unique capabilities that it can bring to bear such as diplomatic measures or economic sanctions. Determining the appropriate role that government should play in dealing with cybersecurity issues will depend on an assessment of the magnitude of the threat in terms of its probability versus the scale of the consequences. Most serious would be state-sponsored attacks that could be the equivalent of acts of war. Other threats that might demand different types of responses include lower level attacks originated or sponsored by foreign governments, cyber threats or terrorism from non-state actors, industrial espionage from unknown sources, or economically motivated actions such as cyber fraud.

The recent Presidential Policy Directive (PPD-41, see sidebar above) represents a useful step toward improving coordination of responses to cyber attacks within the Executive Branch. But mobilizing an effective governmental response to cybersecurity threats remains challenging. One problem is a fragmentation of responsibility in both the executive and legislative branches. In the House of Representatives, for example, at least five different committees have some responsibility for security and privacy issues, and for some of them, particularly the smaller committees, these issues are typically a low priority.

More also needs to be done to coordinate public and private responses. Companies want to know where they should focus their contributions, and the government could provide them with a frame-

work to guide their decision making. And government may also have a legitimate role to play in helping companies that are attack victims when the risk is too great or the tools are too limited for them to retaliate on their own.

Participants recommended that the new Administration, along with Congress, should convene a blue-ribbon public-private group to map what key entities currently do and do not do, identify gaps, and recommend improvements to shore up security. This group should make recommendations for improvement in the structure of the government, including possible consolidation of responsibilities across agencies, to improve coordination of responses. In addition to looking at the role of the U.S. government, the group should also consider the roles of states and international bodies in cybersecurity.

Privacy. The reality is that consumers do not understand their exposure and the greater risks to their privacy that have resulted from the shift from the comparatively secure and private channels of communications, such as traditional land line telephone networks and mail sent through the U.S. Post Office, to the more efficient but more open and insecure world of the Internet and IP-based communications. We need better ways to inform consumers about their privacy risks and what they can do about it.

We need better ways to inform consumers about their privacy risks and what they can do about it.

The participants called for creation of a unitary framework for privacy protection that is both comprehensive and comprehensible. A useful first step would be a call from the Administration or jointly from the FCC and the FTC for proposals for actions that could be taken to better protect privacy. Then, somewhat like the proposal for cybersecurity, a multi-stakeholder group (that includes members of Congress) should work through key issues and agree on a set of principles for a unified privacy protection framework.

Anticipating Black Swans

Before the conference ended, the participants considered the possibility of an unanticipated event—a black swan—occurring that would have the ability to reshape the telecom policy agenda, reducing the priority for some issues or increasing the urgency of others, or introducing entirely new issues. Blair Levin described five different kinds of black swans:

- ***Macro-economic***—e.g., a big recession that depresses demand and discourages capital investment.
- ***Micro-economic***—e.g., industry realignment, due to one or more big acquisitions, or a major shift in the balance of competition within a market.
- ***Technology breakthrough***—e.g., a powerful tech innovation that dramatically lowers cost or increases the performance of a network, or a new entrant who introduces new capabilities that change a market configuration.
- ***Incident***—e.g., a "cybersecurity Pearl Harbor" type of malicious attack, a "cyber Three Mile Island" type of inadvertent accident or natural disaster that results in a prolonged network failure that disrupts communications and commerce and other critical activities sufficiently to shake public confidence in the digital economy.
- ***International event***—e.g., a sharp increase in anti-American Internet policies abroad or foreign interference with U.S. satellite operations or a trade war that compromises the flow of information internationally.

The group also took note of the possibility of an unanticipated positive but disruptive event—a golden swan, perhaps—that would also be of sufficient magnitude to reshape the communications policy agenda. Included here might be rapid growth of blockchain-based applications that reshape a field like banking or healthcare, a major advance in artificial intelligence and/or robotics that makes previously science fictional scenarios a reality, or a breakthrough in quantum computing that makes hitherto unthinkable amounts of computing power available, or the arrival of a new ultra-high performance wireless technology that obsoletes wired or current wireless networks.

Although the probability of any one of these events happening may be low, it is not at all unlikely that some such event will occur during the next Administration that will cause a re-ordering of policy priorities. But whether or not a black swan or golden swan appears, it is certain that the next administration will have to address an extensive and urgent telecommunications policy agenda.

Endnotes

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APPENDIX

The Thirty-First Annual Aspen Institute
Conference on Communications Policy

Setting the Communications Policy Agenda for the Next Administration

Aspen, Colorado
August 14-17, 2016

Conference Participants

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About the Author

Richard Adler is a Distinguished Fellow at the Institute for the Future, Palo Alto. He is also president of People & Technology, a consulting firm located in Silicon Valley. His research has focused on the impact of new technologies on fields including business, education, healthcare and aging.

Richard is the author of the reports from each of the previous Aspen Roundtables on *Innovation: Making the Invisible Visible* (2016); *Navigating Continual Disruption* (2015); *Fragmentation and Concentration in the New Digital Environment* (2014); *Connecting the Edges* (2013); *Institutional Innovation: Oxymoron or Imperative?* (2012); *Solving the Dilbert Paradox* (2011); *Leveraging the Talent-Driven Firm* (2010); and *Talent Reframed* (2009).

Other reports written by Richard for the Aspen Program on Communications & Society include: *Preparing for a 5G World* (2016); *Updating Rules of the Digital Road: Privacy, Security, Intellectual Property* (2012); *News Cities: The Next Generation of Healthy Informed Communities* (2011); *Media and Democracy* (2009); *m-Powering India: Mobile Communications for Inclusive Growth* (2008); and *Minds on Fire: Enhancing India's Knowledge Workforce* (2007). He is also the author of *Healthcare Unplugged: The Evolving Role of Wireless Technology* (California HealthCare Foundation, 2007) and two articles on the future of education co-authored with John Seely Brown. This past spring, he contributed a series of columns to *Computerworld* on the future of broadband technology.

Richard is Fellow of the World Demographic Association and serves on a number of local and national boards. He holds a BA from Harvard, an MA from the University of California at Berkeley, and an MBA from the McLaren School of Business at the University of San Francisco.

About the Communications and Society Program

www.aspeninstitute.org/c&s

The Communications and Society Program is an active venue for framing policies and developing recommendations in the information and communications fields. We provide a multidisciplinary space where veteran and emerging decision-makers can develop new approaches and suggestions for communications policy. The Program enables global leaders and experts to explore new concepts, exchange insights, develop meaningful networks, and find personal growth, all for the betterment of society.

The Program's projects range across many areas of information, communications, and media policy. Our activities focus on issues of open and innovative governance, public diplomacy, institutional innovation, broadband and spectrum management, as well as the future of content, issues of race and diversity, and the free flow of digital goods, services, and ideas across borders.

Most conferences employ the signature Aspen Institute seminar format: approximately 25 leaders from diverse disciplines and perspectives engaged in a moderated roundtable dialogue, with the goal of driving the agenda to specific conclusions and recommendations. The program distributes our conference reports and other materials to key policymakers, opinion leaders, and the public in the United States and around the world. We also use the Internet and social media to inform and ignite broader conversations that foster greater participation in the democratic process.

The Program's Executive Director is Charles M. Firestone. He has served in this capacity since 1989 and also as Executive Vice President of the Aspen Institute. Prior to joining the Aspen Institute, Mr. Firestone was a communications attorney and law professor who has argued cases before the United States Supreme Court. He is a former director of the UCLA Communications Law Program, first president of the Los Angeles Board of Telecommunications Commissioners, and an appellate attorney for the U.S. Federal Communications Commission.

Previous Publications from the Aspen Institute Communications Policy Project

Preparing for a 5G World, by Richard Adler

The 2015 Roundtable on Spectrum Policy took place in Queenstown, MD, October 26-28, 2015. This report is a series of chapters, written by rapporteur Richard Adler, which synthesizes the ideas that emerged from participants during the two-day dialogue. It examines the range of needs that the next generation of wireless innovation, 5G, is intended to address and seeks to understand the technological options for meeting those needs. 2016, 67 pages, ISBN Paper: 0-89843-646-X, $12.00

Skirting Bottlenecks: Policies to Support Network Evolution, Digital Inclusion and Data Security, by John B. Horrigan

The Thirtieth Annual Aspen Institute Conference on Communications Policy, titled "The Future of Broadband Competition," took place on August 12-15, 2015 in Aspen, CO. Robust competition among communications providers has always been a crucial goal for policymakers, leading to robust, innovative and efficient delivery of services. But what does the competitive communications marketplace of the future look like? 32 leading communications policy leaders and experts gathered in Aspen to investigate policy goals that can ensure this robust, competitive marketplace, and consider how broadband markets can promise delivery of economic and social benefits that improve the quality of life in America for all. The report, written by rapporteur John B. Horrigan, offers five recommendations for the future of broadband competition. 2016, pages, ISBN Paper: 0-89843-643-5 , $12.00

Making Waves: Alternative Paths to Flexible Use Spectrum, by Dorothy Robyn

The 2014 Aspen Institute Roundtable on Spectrum Policy (AIRS) gathered 26 of the top telecommunications policy experts at the Aspen Wye River Conference center in Queenstown, MD, to investigate

whether the U.S., in light of recent progress in alternative approaches to spectrum allocation, should make the more drastic move to a regime that has all spectrum, other than some carved out for specific public benefit, to be considered general use spectrum eligible for the highest and best use available. The report, written by Roundtable rapporteur, Dorothy Robyn, tackles the task of describing what general purpose spectrum actually is; discusses the practical, political and institutional limits and ways to overcome them; and details the necessary technical advances and regulatory actions to make general purpose spectrum a reality. 2015, 68 pages, ISBN Paper: 0-89843-625-7, $12.00

The Atomic Age of Data: Policies for the Internet of Things, by Ellen P. Goodman

The Twenty-Ninth Annual Aspen Institute Conference on Communications Policy, titled "Developing Policies for the Internet of Things," took place August 13-16, 2014 in Aspen, CO. As the world becomes increasingly connected and more objects become embedded with sensors, the Internet of Things is poised to explode, with estimates of 25 billion connected devices by 2020. 35 knowledgeable participants gathered to examine how specifically should communications policies accommodate the new Internet of Everything? This report explores the nascent promises and challenges of the IoT. In examining the interplay between the vast increase in data created on the Internet of Things (IoT), and the resultant strain on the networks that carry this information, and the group came to a realization. Data needs to be thought of as "infrastructure." 2015, 72 pages, ISBN Paper: 0-89843-623-0, $12.00

Video Veritas: Building a 21st Century Video Platform for a High-Performance Society, by John B. Horrigan

The Twenty-Eighth Annual Aspen Institute Conference on Communications Policy focused on the future of video regulation. The resulting report, written by John B. Horrigan, looks at the changing landscape of video regulation and the fundamental shift in how video is being viewed. While cable and broadcast television continue to be the dominant modes of transmission, over the top delivery of content via the Internet provides new ways to distribute personalized and targeted programming

directly to the viewer. This, and the proliferation of mobile devices and tablets can deliver video to the viewer anywhere, anytime. As a result, the advertising-based broadcast business model is undergoing significant challenge and change. This report examines the evolving video ecosystem and offers recommendations for policy that can accommodate the new video market. 2014, 54 pages, ISBN Paper: 0-89843-603-6, $12.00

Spectrum as a Resource for Enabling Innovation Policy, by William Webb

The 2012 Aspen Institute Roundtable on Spectrum Policy (AIRS) convened shortly after the presidential election to consider ways that spectrum policy could improve the economy through innovation. The 32 leading communications policy experts in attendance focused on how spectrum policies could help create an environment that makes it easier to use spectrum as a resource for innovative new goods and services. The participants first identified problems facing new entry and innovation today, and then recommended solutions, looking specifically at the interstices among licensed and unlicensed approaches, spectrum sharing and flexibility, and new institutional arrangements to manage these solutions. The report, written by British spectrum expert William Webb, sets forth 11 recommendations that he gleaned from the conference dialogue to guide future spectrum policy development with regard to facilitating innovation. 2013, 45 pages, ISBN Paper: 0-89843-584-6, $12.00

Rethinking Communications Regulation, by Richard Adler

As the Internet and other information and communications technologies grow exponentially, and as a new ecosystem is emerging that could conflate previously distinct methods of communication into a single digital medium, questions arise as to whether the traditional silos of regulation are still appropriate. The report resulting from the 27th Annual Aspen Institute Communications Policy Conference addresses the overarching concern as to whether the Communications Act needs a radical revision. Written by rapporteur Richard Adler, the report considers the key goals of a new communications regime and offers regulatory and non-regulatory approaches for achieving these goals in a digitally connected world. 2013, 65 pages, ISBN Paper: 0-89843-583-8, $12.00

The Reallocation Imperative: A New Vision for Spectrum Policy, by Preston Marshall

The report resulting from the 2011 Aspen Institute Roundtable on Spectrum Policy addresses new ways of allocating, clearing, using and/or sharing spectrum controlled by private parties and government agencies. Written by rapporteur Preston Marshall, the report attempts to step back and establish a broad vision for reallocating spectrum in the United States in the public interest, discussing new approaches that will facilitate more effective and efficient spectrum use. A number of recommendations are laid forth to guide future spectrum policy development, Congressional actions, and technology explorations. 2012, 54 pages, ISBN Paper: 0-89843-570-6, $12.00

Updating Rules of the Digital Road: Privacy, Security, Intellectual Property, by Richard Adler

Given the current growth and importance of the Internet, the report of the 2011 Aspen Institute Conference on Communications Policy titled *Updating Rules of the Digital Road: Privacy, Security, Intellectual Property*, highlights the elements that will allow for greater use of broadband as the common medium: security, privacy and intellectual property regulation. Written by rapporteur Richard Adler, the report explores a range of threats that plague the use of today's communications media and provides a series of recommendations which aim to ensure that users' communications are secure, private and protected.

The report reflects the issues and ideas raised by business leaders, academics, and policy experts at the Twenty-Sixth Annual Aspen Institute Conference on Communications Policy. 2012, 70 pages, ISBN Paper: 0-89843-563-3, $12.00

Spectrum for the Next Generation of Wireless, by Mark MacCarthy

Spectrum for the Next Generation of Wireless explores possible sources of spectrum, looking specifically at incentives or other measures to assure that spectrum finds its highest and best use. It includes a number of recommendations, both private and federal, of where and how spectrum can be repurposed for wireless use. In November 2010, the Aspen Institute Communications and Society Program convened the Aspen Institute Roundtable on Spectrum Policy, where 31 experts and leaders

addressed the consequences and solutions to the increasing demand for spectrum. Spectrum for the Next Generation of Wireless is the report resulting from the Roundtable discussions. 2011, 68 pages, ISBN Paper: 0-89843-551-X, $12.00

Rewriting Broadband Regulation, by David Bollier

The report of the 25th Annual Aspen Institute Conference on Communications Policy in Aspen, Colorado, considers how the United States should reform its broadband regulatory system. Participants looked at international models and examples and examined how data and communications should be protected in the international arena. The resulting report explores a range of policies for U.S. broadband regulation, many of them derivative of the National Broadband Plan adopted by the Federal Communications Commission only a few months before the conference.

Participants also ventured into new and interesting territory with the novel concept of "digital embassies." They saw this as a way of dealing with jurisdictional issues associated with the treatment and protection of data in the cloud, i.e., data that is provided in one country but stored or manipulated in another. The concept is that the data would be treated throughout as if it were in a kind of virtual embassy, where the citizenship of the data (i.e., legal treatment) goes along with the data. This policy seed has since been cultivated in various other regulatory environments. 2011, 37 Pages, ISBN Paper: 0-89843-548-X, $12.00

Scenarios for a National Broadband Policy, by David Bollier

The report of the 24th Annual Aspen Institute Conference on Communications Policy in Aspen, Colorado, captures the scenario building process that participants used to map four imaginary scenarios of how the economy and society might evolve in the future, and the implications for broadband policy. It identifies how certain trends—economic, political, cultural, and technological—might require specific types of government policy intervention or action. 2010, 52 pages, ISBN Paper: 0-89843-517-X, $12.00

Rethinking Spectrum Policy: A Fiber Intensive Wireless Architecture, by Mark MacCarthy

Rethinking Spectrum Policy: A Fiber Intensive Wireless Architecture is the report resulting from the Aspen Institute Roundtable on Spectrum Policy, held at the Aspen Wye River Conference Center in November 2009. Written by rapporteur Mark MacCarthy, the report captures the insights of the participants, exploring innovative ways to respond to the projections of exponential growth in the demand for wireless services and additional spectrum. In addition to discussing spectrum reallocations, improved receivers, shared use and secondary markets as important components for meeting demand, the report also examines opportunities for changes in network architecture, such as shifting the mix between fiber and wireless. 2010, 58 pages, ISBN Paper: 0-89843-520-X, $12.00

ICT: The 21st Century Transitional Initiative, by Simon Wilkie

The report of the 23rd Annual Aspen Institute Conference on Communications Policy in Aspen, Colorado addresses how the United States can leverage information and communications technologies (ICT) to help stimulate the economy and establish long-term economic growth. The report, written by Roundtable rapporteur Simon Wilkie, details the Aspen Plan, as developed in the summer of 2008, prior to the economic meltdown beginning in September 2008 and prior to the election of Barack Obama as President. The Plan recommends how the Federal Government—through executive leadership, government services and investment—can leverage ICTs to serve the double bottom line of stimulating the economy and serving crucial social needs such as energy efficiency and environmental stewardship. 2009, 80 pages, ISBN Paper: 0-89843-500-5, $12.00

A Framework for a National Broadband Policy, by Philip J. Weiser

While the importance of broadband access to functioning modern society is now clear, millions of Americans remain unconnected, and Washington has not yet presented any clear plan for fixing the problem.

Condensing discussions from the 2008 Conference on Communications Policy and Aspen Institute Roundtable on Spectrum Policy (AIRS) into a single report, Professor Philip Weiser of the University of Colorado at

Boulder offers a series of specific and concrete policy recommendations for expanding access, affordability, and adoption of broadband in the United States. 2008, 94 pages, ISBN Paper: 0-89843-484-X, $12.00

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