

ICT: The 21st Century Transitional Initiative

Simon Wilkie
Rapporteur



THE ASPEN INSTITUTE

Communications and Society Program

Charles M. Firestone

Executive Director

Washington, DC

2009

To purchase additional copies of this report, please contact:

The Aspen Institute
Publications Office
P.O. Box 222
109 Houghton Lab Lane
Queenstown, Maryland 21658
Phone: (410) 820-5326
Fax: (410) 827-9174
E-mail: publications@aspeninstitute.org

For all other inquiries, please contact:

The Aspen Institute
Communications and Society Program
One Dupont Circle, NW
Suite 700
Washington, DC 20036
Phone: (202) 736-5818
Fax: (202) 467-0790

Charles M. Firestone
Executive Director

Patricia K. Kelly
Assistant Director

Copyright © 2009 by The Aspen Institute

The Aspen Institute
One Dupont Circle, NW
Suite 700
Washington, DC 20036

Published in the United States of America in 2009
by The Aspen Institute

All rights reserved

Printed in the United States of America

ISBN: 0-89843-500-5

09-003

1713CSP/09-BK

Contents

FOREWORD , <i>Charles M. Firestone</i>	vii
ICT: THE 21ST CENTURY TRANSITIONAL INITIATIVE , <i>Simon Wilkie</i>	
The Current State: An Incomplete Information Revolution	1
Presidential Leadership and ICT: The Initiative	2
<i>Presidential Executive Order</i>	4
<i>ICT Audits</i>	4
<i>CTO Coordination</i>	5
<i>Incentives</i>	5
After the Initiative: ICT Policy Recommendations	6
<i>Spectrum Inventory</i>	6
<i>Agency Coordination</i>	8
<i>ICT Braintrust</i>	9
<i>Hometown Security Interoperability</i>	9
Discerning National ICT Objectives	10
<i>Debunking ICT as a Short-Term Economic “Golden Goose”</i>	11
<i>Supporting the Double Bottom-Line</i>	12
ICT Stimulus in Action.....	15
<i>Increase Network Access</i>	15
<i>Bolstering ICT Research</i>	19
<i>Localized ICT Efforts</i>	20
Stimulating Without Any Funds	21
<i>Data Collection</i>	21
<i>Removing Roadblocks</i>	22
<i>Spectrum Options</i>	23
<i>Universal Service Fund</i>	24

Energy Efficiency and Conservation through ICT.....	25
<i>Improving the ICT Sector’s Energy Efficiency</i>	26
<i>Using ICT to Impact Other Sectors</i>	27
<i>ICT Efficiencies from a Broadband World</i>	29
<i>Attune Regulation to its Impact on Energy Issues</i>	30
Conclusion.....	31

APPENDIX

Leveraging Communications for Economic Stimulus:	
Participant Recommendations.....	35
Leveraging Communications:	
ICT as Economic Stimulus, <i>Scott Wallsten</i>	45
ICT & the Economy:	
Creating a Double Bottom-Line, <i>Alec Ross</i>	53
An Essay Constituting One of the Many Reasons Why the U.S. Congress would not Solicit Advice from Michael Katz about Spending the Money, <i>Michael Katz</i>	61
Conference Participants.....	67
About the Author	71
Select Publications from the Aspen Institute	
Communications and Society Program	73
About the Aspen Institute	
Communications and Society Program	79

*This report is written from the perspective of an informed observer at the
Twenty-Third Annual 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 August 2008, the Aspen Institute Communications and Society Program convened 29 experts and leaders in communications policy from government, business, academia, and the non-profit sector to address how the next Administration of the United States Government could leverage information and communications technologies (ICT) to help stimulate the economy and establish long-term economic growth. The Institute, a non-partisan, non-ideological, non-profit organization, brought together leaders from across the political spectrum with the aim of making specific recommendations to the new government.

This report 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. While we are releasing the report in January 2009, the essential recommendations have been known since the previous summer.

Underlying each of the recommendations is the strong belief that policy reforms, investments, and certain uses of ICT can lead to significant economic and social gains throughout the country, serving a double bottom line. As an exercise, the group contemplated the government's spending up to \$10 billion in this area as part of its economic stimulus, but it also made many suggestions that would cost very little.

There was remarkable consensus around the recommendations made and detailed in the following report. However, not every participant agrees with every recommendation, and thus each specific statement or proposal should not be viewed as necessarily the view of each participant or his or her employer.

The Aspen Plan. The recommendations fit into three over-arching categories. First, there is a desire to see strong **presidential leadership to promote digitization of government services**. This, it is suggested, should be expressed very early in the Administration in an Executive Order that also mandates the adoption of a coordinated ICT layer throughout government. To help achieve these goals, the group recommended a government-wide auditing of ICT and electromagnetic spec-

trum uses and opportunities; the coordination within the government of agencies with ICT responsibilities; coordination of the federal government with businesses, state and local governments and the scientific communities in this area; and the pursuit of interoperability of communications for public safety first responders.

Key to this strong presidential thrust would be the creation of a **Chief Technology Officer (CTO)**. We note, of course, that President-elect Obama did propose to install a CTO, but the group submits that it is very important for such office to have budgetary responsibilities in order to be effective. Accordingly, it suggests that the CTO also be a deputy director of the Office of Management and Budget.

Recommendations for ICT Infrastructure. Most groups looking at this area of ICT infrastructure encourage widespread diffusion of broadband, and suggest uses of the Universal Service Fund (USF) to achieve this. The Aspen conference agrees with this, recommending the targeting of funds to underserved areas, to key facilities such as hospitals that could serve as “anchor tenants” in such areas, and backhaul access.

But the Aspen conference found it even more crucial to **increase broadband adoption rates**. This can be done most economically first by gathering better information on broadband adoption, including its insertion as a question in the U.S. Census Survey.

In addition to the use of the USF for broadband rather than voice support, the group suggests subsidization of devices and service bundles, as is the practice in the wireless service.

Other measures to facilitate infrastructure development are to increase spending on ICT research by (1) surveying basic research being conducted, and conducting other relevant studies, (2) increasing and/or refocusing budgets of ICT related agencies (e.g., DARPA, NSF, NIST), and (3) creating a national lab for ICT. Additionally, the group suggests the removal of legal and regulatory roadblocks to infrastructure developments, and urges the government to facilitate the uses of rights of way.

ICT for Energy Savings and Environmental Benefit. The Aspen conference considered a number of areas where creative approaches could promote broadband usage *and* serve the double bottom line of financial

and social benefit. The third category of recommendations focused on one crucial area of social benefit: energy efficiency, conservation and environmental stewardship.

The group looked first to the ICT industry itself, a significant user of energy, urging these businesses to improve their energy efficiency and recycling practices. A more transformative proposal, however, was in support of **Smart Grids**, linking the electric grid to the Internet economy. To do so, the government needs to promote interoperability standards, putting meters and appliances on the Internet so that consumers can monitor the use of their energy consuming devices, use less electricity during high-cost peak times, and even sell energy back into the grid where possible.

The Aspen participants also pointed out that with ubiquitous broadband deployment, more people can telecommute, saving significant energy costs in substituting communications for transportation to the workplace. And they suggested other ways that governments at all levels could aid the environment by, for example, examining the impact of regulations on energy use before adoption of new regulations, and by setting examples of energy conservation by the use of ICT in delivering government services.

In sum, the Aspen Plan looks to the next Administration to recognize the leverage that ICT can bring to the economy and the society. By stimulating broadband access, adoption, and demand—through government services, leadership, and investment—the Federal Government can use this transformative technology to serve the double bottom lines of stimulating the economy and serving social needs. It could even serve a third bottom line, good government.

Acknowledgments

We want to take this opportunity to thank our sponsors for making this conference possible: AT&T, CableLabs, Cablevision Systems, Cisco Systems, Comcast Corporation, Cox Enterprises, Credit Suisse, The Entertainment Software Association, Google, Intel, National Association of Broadcasters, Qualcomm, Stifel Nicolaus, Time Warner, Verizon Communications, and the Walt Disney Company. We want to acknowledge and thank Simon Wilkie for his account of the conference discus-

sions; authors Scott Wallsten, Alec Ross and Michael Katz for crafting the three commissioned papers for the August 2008 meeting, reprinted in the Appendix of this report; and to our participants, also listed in the Appendix, for their contributions to this complicated topic. I also want to thank Sarah Snodgress, Project Manager, and Tricia Kelly, Assistant Director of the Aspen Institute Communications and Society Program, for their help in producing the conference and this report.

Charles M. Firestone
Executive Director
Communications and Society Program
Washington, D.C.
January 2009

**ICT: THE 21ST CENTURY
TRANSITIONAL INITIATIVE**

Simon Wilkie

ICT: The 21st Century Transitional Initiative

Simon Wilkie

The purpose of the 2008 Aspen Institute Conference on Communications Policy was to identify means of leveraging Information and Communication Technologies (ICT) to address the great domestic problems of our time including the ailing economy and the energy crisis, and age-old difficulties of effectively providing and maintaining government services for all Americans. The Aspen Institute convened 29 experts and leaders on the matter of ICT, a diverse group whose experience stretches broadly from civil service to Wall Street, from academia to corporate boardrooms, from Washington, New York, and Los Angeles to Fort Wayne, Indiana. The opinions and recommendations that follow represent the general consensus of those collected viewpoints, though not all participants agreed with every point contained in this Report.

The Current State: An Incomplete Information Revolution

We stand at the cresting moment of the Information Revolution. The power of the Internet is our time's incarnation of the Industrial Revolution. Much like its predecessor, it is destined to remake the platforms upon which we work, play, create, and interact. When the rapid spread of railroads threw open the possibilities of intra- and inter-continental trade, the economies of money, goods, and services were suddenly launched into broader geographical spheres and sped up from the plodding rate of horseback travel to the necksnapping pace of the Iron Horse. Anywhere the railroad went, civilization hurtled forward in a way never seen before. But imagine the country without that crucial step: Would the Pony Express deliver social security checks to the brave few who'd dared to settle west of the Appalachians? Would fresh fruit be an impossibility throughout the East Coast winter? Would the Lakers need to take a cutter around Cape Horn to play the Celtics in the Garden? The changes the Industrial Revolution brought us are concrete and ubiquitous, as practically essential to our national lifestyle as they are poetic.

The coming revolution of electronically delivered information has the same potential to drive development in leaps instead of steps, to leverage Information and Communication Technologies (ICT) investments into wider-spread productivity gains. Those present at the dawn of the Industrial Revolution could not have imagined the many ways it would reinvent commerce and society. Similarly, we cannot know all the ways the Information Revolution will ultimately transform society.

While we do not know how exactly the information revolution will change society, we do know, however, that this revolution is powerful. It is incumbent upon us to guard against making decisions that may eventually prove costly in terms of lost innovative opportunities and to ensure that any benefits flow to all Americans rather than just a lucky few.

But the United States is not yet in a position for all to benefit. Largely due to willingness and ability to pay, between 20-30% of the population does not currently connect to the broadband networks that allow for participation in the network of instantly available information. Additionally, the economy often makes inefficient use of this new tool, and many of the beneficial and desired applications have not yet been realized.

Conference participants at the 2008 Aspen Institute Conference on Communications Policy concluded that a major, Presidentially-directed policy initiative is necessary, imperative even, to speed a national transition to an electronically enabled society. The following text offers background and recommendations to begin such an Initiative.

Presidential Leadership and ICT: The Initiative

The Obama Administration will face two daunting economic challenges that will require immediate attention. The current tumultuous economic climate and the crises surrounding the national energy supply and consumption rates have both been central issues to the 2008 presidential campaigns. Transforming and reprioritizing federal Information and Communication Technologies policy will be a formidable tool in those two struggles. The key to the success of such a transformation will be the legal authority and national impetus that can only be wrought through Presidential leadership, working in coordination with municipal, county, state, and federal officials. The headlining element of the transforming initiative will be a push for intradepartmental ICT reform

in federal-level executive agencies. Aspen conferees named the program “ICT: The 21st Century Transitional Initiative [the Initiative].”

The mission of the Initiative includes three main interdependent goals. Because one of the goals is to digitize government service delivery in as many instances as possible, doing so would leverage ICT to improve the performance of government services and to further the reach of existing efforts to address major societal challenges like health care, housing, and education. The second goal is to add or enhance an ICT layer in the internal workings of every government agency that would make it a priority to use ICT in places that have relied on paper technology in the past. This layer would help to ensure that the digitization of government services is performed in an optimal way that is accessible by all. The third goal is to connect to the broadband network the last 20-30% of the population who are currently not connected due to availability or willingness, so that they will be able to access the new, digitized government services.

Achieving these goals will carry several benefits. Electronically deliverable government services will save constituents time and will be available in convenient formats that ensure uniform, optimal quality of service. Some examples of limited programs that have succeeded along these lines are e-filed tax returns and online driver’s license renewals.

Another major benefit will be significant savings due to an improvement in task-efficiency. For example, one RAND Corporation study that was repeatedly cited by both the Obama and Hilary Clinton campaigns indicated that moving to fully electronic medical records would have an initial cost of \$50 billion, but would then recoup \$77 billion in annualized savings thereafter. Having a clear ICT layer in each executive department would also bring the benefit of increased transparency and governmental accountability.

It would also bring a voice of ICT expertise into the leadership of each department, which would then be able to recommend changes to the constituent-interaction branch of the department to ensure that the services are delivered rapidly, yet with the same agility and human intelligence that face-to-face interaction fosters.

In addition, the presence of government online could drive the demand side of the market, encouraging increased adoption of broadband connections for both residences and small businesses, which lag

behind residences in adoption. Eli Noam, Professor of Economics and Finance at Columbia University, as well as the Director of the Columbia Institute for Tele-Information, sees small business broadband adoption as especially important. “If we’re concerned about national economic activity and productivity, then we’ve got to focus on getting these small businesses connected to high-speed, robust networks.”

Presidential Executive Order

The implementation of the Initiative must begin with a Presidential executive order, preferably issued on the President’s first day in office. Joe Waz, Senior Vice President of External Affairs and Public Policy Counsel for the Comcast Corporation, said, “The order should come on day one. That way, it will have the immediate authority of the new regime.” The executive order should place authority and accountability for carrying out the Initiative in the hands of a Cabinet-level executive.

There were various suggestions as to who this executive could be. Some posited that it should be a newly-created position, a kind of Chief Technology Officer for the incoming Administration. Others thought that the powers should be vested in a position that already exists, such as the head of the Office of Science and Technology Policy (OSTP). However, the most popular suggestion was that the powers should be vested in the Deputy Director of the Office of Management and Budget (OMB), because of already-vested power over the various departments’ budgets.

One other necessary element for getting the Initiative off to a successful start will be to give preference to candidates for Presidential appointments with demonstrated ICT competence. The logic for this is plain: If those making the decisions are personally familiar and comfortable with ICT, they will be more likely to see the need for the changes which the participants consider imperative.

ICT Audits

The newly minted Chief Technology Officer (CTO), no matter what the title will be, should begin by mandating an ICT audit of each Cabinet-level department and other major agencies, such as the FCC and SEC, to be completed within 100 days of each department’s new

leader taking office. The audit should bear in mind the goal of having an “ICT layer” in place in each department. The audit should first explore and define current processes and use of ICT within the department. Second, it should create an inventory of opportunities to add the ICT layer. Third, it should prioritize those opportunities in terms of cost-effectiveness. With the audit of each agency complete, the CTO should convene a high-level interdepartmental working group whose task is to coordinate implementation by identifying possible opportunities for interdepartmental standardization and cooperation in developing the new systems.

CTO Coordination

Upon review of the audits and working group findings, the CTO’s office should determine what CTO staffing would be appropriate in each agency to tie every agency’s ICT layer under the CTO’s head for coordination purposes. The CTO should also work with the appropriate Secretaries to determine what the relevant staff members will be empowered to do, so as to ensure a clear mandate that will allow those employees to do their jobs without being split by answering to two masters. The role of those CTO staffs should be to apply the ICT strategies suggested by the audits across the board and to look ahead to what ICT’s role should be in meeting future challenges and opportunities.

The CTO’s office should also set about generating standards and templates for ICT work across departmental lines. This will assist in ensuring that the highest quality security can be employed to keep the private, personal data safe which online government might lay open to new threats of exposure. It will also make the adoption of the online governance systems easier for the consumer, which should drive market activity and increase the rate of adoption.

Incentives

The group proposed several models to incent ICT excellence and the adoption of best practices among federal agencies. For instance, Presidential commendation of a worker on the federal level can be translated into individual career currency. Such commendation may include an awards system modeled on the successful Baldrige Awards that are moderated by the National Institute of Standards and

Technology (NIST). An outside jury would consider certain nominated employees on the merits of their innovative and fruitful approaches to using ICT in government, and the winners would be awarded by the President himself.

The group discussed another incentive to tie a department or program's funding to its successful adoption of ICT. One model is to give preference in agency grant programs to projects that would feature effective ICT implementation to improve efficiency. Another model, proposed by Graham Richard, President of Graham Richard Associates, LLC, and the former Mayor of Fort Wayne, Indiana, would be to choose a department to host a pilot incentive program similar to those that succeeded wildly during his tenure as Mayor of Fort Wayne. If the department manages to come in under budget for a given period of time, it is understood that the department may keep half of the savings to spend on a pre-approved ICT build-out plan. Essentially, the department establishes an ICT wish list that now assigns an opportunity cost to coming in under budget.

After the Initiative: ICT Policy Recommendations

The Initiative's reformation of the ICT approaches of Cabinet-level agencies could prime the pump for the rest of the ICT policy recommendations. It could lend momentum to the migration of government into ICT necessary for the national transition into the potential of 21st century technology. Following are other necessary steps that will ready the country's arrival online, anchored at the White House and backed by Presidential support.

Spectrum Inventory

The government-controlled spectrum is currently fractured throughout countless agencies and earmarked for equally countless projects and purposes. Much of this bandwidth goes unused most of the time, gathering proverbial dust instead of facilitating much more productive applications. Such a misallocation of this enormously valuable resource is wasteful in terms of both real and opportunity costs. There are also wasteful aspects in the use of spectrum by the private sector. As Deborah Taylor Tate, FCC Commissioner, said, "We absolutely must know who owns the spectrum and how it is being utilized. These are not and should not be political decisions, these are scientific decisions. We need scientists, engi-

neers and spectrum experts—not politicians—advising us regarding the most efficient and effective use of this critical national resource going forward.” Kathryn C. Brown, Senior Vice President for Public Policy Development and Corporate Responsibility at Verizon Communications, agreed, “There desperately needs to be a unified map of the spectrum system put into one place and accounted for.”

One of the first ICT acts of the next Administration, following up past efforts under the President’s Spectrum Management Initiative, should be to appoint an expert to conduct a thorough inventory of all government spectrum: its allocating agency, its designated use, its past and projected future use patterns, its potential value at auction, etc. This information should be gathered into a single, publicly available document. Brown put forth the name of one expert who was a member of this conference as her choice for the person to conduct the inventory, and it was met with wide assent: Dale Hatfield, who is an independent ICT consultant, as well as an adjunct professor in the Interdisciplinary Telecommunications Program at the University of Colorado at Boulder.

Once the inventory has been taken, a strategy should be put in place to work toward a more efficient model for determining the way the spectrum should be used. One such strategy was proposed by Peter Phillips, Partner for Strategy and Market Development at Ofcom. (Ofcom, or Office of Communications, is the independent regulator and competition authority for the communications industries within the United Kingdom.) In the UK, the government agencies that use spectrum bandwidth are required to pay market value for the rights to their spectrum. This plan has cut spectrum waste dramatically and allowed for valuable auctioning of spectrum that was sitting unused beforehand. Such a policy would prevent departments that do not use all of their current spectrum allocations from holding onto it, “just in case.” As Phillips put it, “The key for us has been charging government users for their spectrum, so they will be forced to value it similarly to private users, and make smart, non-wasteful choices about it. It has been an unqualified success.”

The legal framework to allow this is already in place in OMB Circular A-11, which says that agencies need to take into account the opportunity cost of their spectrum. Also, the Commercial Spectrum Enhancement Act of 2004 (CSEA) incited the Department of Defense as well as over a dozen other agencies to voluntarily relinquish the 3G frequencies. It leveraged the

market value of the frequencies with the government's need for new equipment—and the ability to accomplish government missions in the “higher up,” less valuable area of the radio frequency spectrum. (This was one of the reasons that participants thought that the CTO should be co-appointed.) What is necessary is to put the authority of the new President behind the OMB's directive, which would, as Hatfield put it, “give A-11 some teeth.” The new President should specifically order this authority. With the authority of the President behind that order, Michael Gallagher, President and Chief Executive Officer of Entertainment Software Association, and a former Administrator of the National Telecommunications and Information Administration, suggests additional gains will come. “The mother lode of spectrum lies in extending the lessons learned in the CSEA to other areas of government-held spectrum. It was a win for the public, the taxpayer, and the government agencies involved.”

Agency Coordination

Similar to the way that the internal ICT layers of all the Cabinet agencies should be coordinated through the office of the CTO, the efforts of agencies with external ICT regulatory responsibilities should be coordinated within the Executive Branch. Those agencies would include the National Telecommunications and Information Administration (NTIA), the Office of Science and Technology Policy (OSTP), the Department of Justice (DOJ), the Department of State (DOS), the Department of Homeland Security (DHS), and others, in addition to independent agencies like the Federal Communications Commission (FCC) and the Federal Trade Commission (FTC). Because each agency has its own mandate, the coordination should flow through a neutral party with the appropriate auspices and authority. In the past, similar coordination has occurred through the OSTP and the National Economic Council (NEC), or even through the office of the Vice President under Al Gore. It is less important who handles the coordination, and more important that it does happen somewhere. Another item to be decided upon by those members of the various agencies is whether they should meet on an ongoing basis, or only for issue-specific meetings.

ICT Braintrust

The creation of a council body similar to President Eisenhower’s “Brain Trust” is another necessary step, one to ensure that the federal ICT reformations are also successfully adopted by the rest of the country. This council should be made up of stakeholders from outside the federal government in the various ICT issues, pulling together the best minds from the small business community, large industry, state and local governments, academia, and non-profit entities. Such a council would be able to provide guidance from many learned perspectives outside the insular world of the capitol, ensuring that the policymakers receive input from those who will use, own, operate, and invest in, and depend on the implemented ICT initiatives. Currently, there is a nominatively similar body, the President’s Council of Advisers on Science and Technology (PCAST), but in recent years the PCAST’s focus has narrowed considerably. Roundtable participants envision a broader scope of expertise and interests.

Hometown Security Interoperability

The various local first-response systems that make up the front lines of hometown security throughout the country are largely incompatible with each other. Police often cannot directly hail firemen on their radios, hospitals can often only talk to EMTs and neither police nor firemen, and the various levels of local law enforcement (city police, county sheriffs, state police, etc.) have notoriously terrible inter-communication. While these bodies often have legitimate reasons for keeping separate communication channels, in times of extreme emergency, universal emergency communication would be very desirable. Many of the difficulties of such tragedies as 9/11 and Hurricane Katrina were exacerbated by the lack of communication between various first-response entities. The oft-proposed idea of requiring all emergency personnel to operate on a universal system yields unavoidable problems. Simon Wilkie, Professor and Chair of the University of Southern California Economics Department, explained, “Because the police and firemen are fundamentally and irreconcilably opposed—police want ‘Officer down!’ to be the first priority call, and firemen want ‘Fireman in a burning building’ to be first—there is no logical nor mathematical recourse but to input a dictator to make the decision of

which should have first priority.” Nationally, neither police departments nor fire departments are willing to accept that situation on an ongoing basis. Conference participants propose that ICT be employed to give all emergency personnel the ability to interoperate their communications systems with policies in place to limit such communications to the gravest of emergencies. Michael Katz, a chaired professor of business at both New York University and the University of California, Berkeley reasoned, “It’s less about being constantly in touch or being controlled centrally, and more about having the capability in time of crisis to plug into a network.”

Another issue surrounding first-response interoperability has to do with rural emergency call-in systems. Graham Richard, former Mayor of Fort Wayne, Indiana, had some practical insight to share from the rural realities of his home state, Indiana:

A lot of times, the 911 equivalent line goes to the Sheriff’s house. So, since he’s out on duty, his wife answers the phone. But if she runs out to the store for an errand, you’re stuck. There’s no one to take your call. So in Indiana, we have had some success establishing systems for, really, quite cheap, where the calls get forwarded from the Sheriff’s all over the state to a central location, where there’s always someone to answer the phone. And that way, sure, maybe your sheriff doesn’t know you’re hurt, but somebody does, and they can get a hold of him, or send someone else.

The Conference recommends that further study be undertaken immediately, seeking out the best practices of similar programs in rural areas all over the country. Those best practices should then be recommended to the appropriate state and local authorities.

Discerning National ICT Objectives

With a robust ICT program allowing for broad citizen engagement the executive branch can apply the efficiency gains of ICT to the pressing societal issues of the day. But this is a large country with enormous and truly varied problems; which of those problems can best be improved through the use of ICT, and how should they be prioritized?

Debunking ICT as a Short-Term Economic “Golden Goose”

Because of the present economic climate, any initiative that can be seen as something that will assist in quickly digging the country out of its financial hole is particularly politically saleable. Accordingly, the highly hoped-for suggestion for putting ICT to work was that investment in ICT could be employed as part of a short-term economic stimulus plan. However, that idea was rejected nearly unanimously at the conference, and even beforehand in the three short papers that were commissioned from Michael Katz, chaired professor of business at both New York University and the University of California, Alec Ross, Executive Vice President of External Affairs at One Economy Corporation, and Scott Wallsten, Senior Fellow and Vice President of Research at Technology Policy Institute, as starting-points for the conference (see Appendix for commissioned papers). Katz opened the first session by speaking about the three papers:

One thing that is notable about all three papers—and some of them did it by what they did not say, mine by saying it outright—was that none of the three embraced the idea of ICT as short-term macroeconomic stimulus. It seems that much more so, the focus is on long-term solutions. Not so much in the short term, macro sense of the housing bubble and the problems on Wall Street, but much more long term stimulus and promoting economic growth, particularly through innovation.

Indeed, Katz does address the matter outright in his aptly named paper, “An Essay Constituting One of the Many Reasons Why the U.S. Congress would not Solicit Advice from Michael Katz about Spending the Money,” as well as suggesting some alternative ideas:

In summary, forget about using ICT for short-term macroeconomic stimulation. There are other, more appropriate tools. Promoting ICT investment, particularly R&D investment, may be a useful way to stimulate long-run economic growth, but ... using the \$10 billion to address important social issues looks more promising.

Wilkie offered the lessons of history to help define an expectable timeframe for economic productivity gains from ICT investment:

If you look at early studies on ICT investment, they had early returns that were 2% less than traditional manufacturing investment, and it stayed that way for 25 years, until the tech boom of the '90s. It was called the "Productivity Paradox." Why did we spend a trillion dollars on this relatively unproductive investment? So, I think if we look at it in terms of short-term stimulus, it will be a total failure, because any marginal investments will either be marginal or transformative, but way down the line.

There was some minor dissent on the degree to which short-term goals should be abandoned in favor of long-term goals. In particular, Michael Copps, FCC Commissioner, sought to make use of the suggested amount (\$10 billion) to speed along the arrival of those goals. "I take a more expansive view of these possibilities, and I think that, perhaps, we ought to look at how we can get that long-term development faster." However, the conference was unanimous in recognizing that utilizing ICT development to drive short-term macroeconomic stimulation is unrealistic as a primary focus.

Supporting the Double Bottom-Line

Instead of envisioning an ICT policy that primarily addresses a problem that is, admittedly, personally as well as politically expedient to all Americans, the ICT policy should look beyond the immediate. The policy should be designed to push and steer the transformation to an ICT-enabled future. That transformation is unavoidable in the long-term, so it is prudent to embrace it now, and use ingenuity, forethought, and organization.

Since the transformed future will not only encompass the economy, but also government and social society, it is important to set goals that keep the former as well as the latter in mind. Eli Noam, Director of the Columbia Institute for Tele-Information and Professor of Economics and Finance at Columbia University's Business School, recalled the broad effect of a similar transformation from history:

Keep in mind that the struggles of the Industrial Revolution were not just about railroad or manufacturing regulation, but about class, world standing, race, human decency, acceptable standards of living, and massive geographic population shifts. Anticipate that this revolution will also be accompanied by these deep issues.

In anticipation of those “deep issues,” while also understanding that the economic sphere has great influence on the governmental and social spheres, the participants adopted a metric that takes both into account. Instead of the traditional accounting metaphor of the “bottom-line” being a purely numeric dollar figure, the group supports a paradigm that contains two “bottom-lines,” one that accounts for the strength of the economy, and another that accounts for the quality of life of the citizenry. That paradigm is articulated well by Alec Ross in his paper “ICT & the Economy: Creating a Double Bottom-line.” He envisions a national ICT-development effort that values financial, economic growth equally with improvement in the nation’s quality of life, with particular implications for those whose quality of life currently lags behind the mean. Ross describes the possible effect of approaching the task with such an attitude:

In addition to the economic benefit resulting from network deployment and adoption, [an effort that considers both bottom-lines] can produce upward economic mobility and self-sufficiency within targeted populations such as seniors, veterans, and workers displaced by trade. This second bottom-line can have an economic development impact far greater than the benefit of the network deployment and adoption itself.

In pursuing a second bottom-line, conference participants discussed three Quality-of-Life areas that may not be major economic engines; however, they address serious human concerns, and most of them also carry economic side-benefits: end user innovation, hometown security, energy efficiency and conservation.

End User Innovation. Alan Davidson, Director of U.S. Public Policy and Governmental Affairs for Google, gave voice to the principles of use regarding information access. He pointed out that, as we push to migrate more of lived society into published society online, we should seek to protect the well-established principle of user freedom on the Internet. This is the online mirror image of our freedom of speech and has been the source of much of the Internet’s sociable content:

Another fundamental to keep in mind is the end-to-end Internet model and the general purpose computer. This situation has allowed the kind of innovation without permission

that we have been alluding to. There are some policy choices that we have made that make that innovation possible. As a no-brainer starter, we need to commit to preserve policies that make an end-to-end Internet possible. For example, we need to protect Section 230 of the CBA, which protects intermediaries from liability for content that they don't make.

In keeping with the view of the end-user oriented Internet, Davidson also commented that we should seek to reach 100% broadband deployment and adoption because anything less will shut certain people out of an enormously important sector of life in the future. "Keep in mind that there are a lot of other public benefits that come with a broadband deployment: giving people access to news and information, assuring that all these voices will be in the marketplace of ideas, etc."

Hometown Security. Graham Richard, President of Graham Richard Associates and former Mayor of Fort Wayne, Indiana, suggested another category of suggestions designed to safeguard and improve the human quality of life, a field he calls "Hometown Security." He mentioned three main thrusts where applied ICT could make a significant difference in the safety and well-being of the vast population of Americans who live outside of urban areas in small towns and cities. The first is a plan to address a human resources crisis that most small towns will be facing in the next five to ten years. He explained that, with the baby boomers on the verge of retirement, there will be a vacuum of experience and manpower in many municipal and local government jobs. He gave the example that there is a national need for 200,000 electrical utility linemen to replace the country's aging power grid. Is that a task that should be left to an understaffed corps of rookies? To compensate for the aforementioned experience and manpower vacuum, this upcoming generation of linemen will need to be substantially more efficient. Careful use and training with ICT can make that a reality.

The second is a plan to improve emergency medical response. He said that, in Fort Wayne, modern fire technologies such as sprinkler systems and smoke alarms had greatly reduced the percentage of calls to the fire department that were actual fires. Almost 80% of calls to the Fire Department were medical emergencies. ICT networks that can connect these responding firemen (who are, after all fire experts) with medical

experts to help them administer proper care on site and in transit to the hospital could deliver crucial information that might save untold lives.

The third is a plan for a loose, ICT-enabled national network of local government workers providing support for each other by sharing techniques, best practices, and emergency-related information. Richard noted that, across the country, state and local governments (which do not have the seemingly infinite credit of the federal government) are flat broke. There is no money to improve the departmental operations through new purchases or hires, so an at-will network designed to spread ingenuity would be a welcome source of needed help.

Energy Efficiency and Conservation. While there are standing disagreements on many parts of the greater issue of the current energy crises, one area is simply not up for debate: It is an indisputable fact that the United States imports a huge amount of energy, and that Americans pay a pretty penny for it. The economy would benefit greatly by keeping some of that money on its own shores, and so using less energy, whether through conservation efforts or increased efficiency, or both, would benefit the national bottom-line. Also, the domestic economy would operate as a more efficient wealth-generating engine if the ICT policies relating to energy which appear later in this report should apply not only to the quality of life bottom-line, but also the purely financial one.

ICT Stimulus in Action

The three consensus goals for using an ICT stimulus fund to drive eventual economic growth through productivity gains are (1) to increase network access primarily through adoption and secondarily through universal network deployment, (2) to bolster ICT research and development, and (3) to federally support localized efforts to harness ICT in improving local governance.

Increase Network Access

If any national economic transformation is to occur through ICT, the 20-30% segment of the population which is not connected to the network will have to be connected. While 100% adoption is unlikely to ever occur, narrowing that gap to only those who choose to remain

offline is necessary to optimize the productivity gains afforded by network connectivity—not to mention the negative effect on productivity that operating two systems, one digital and one analog, for such a large segment of the population would cause.

Participants had several suggestions to close that connectivity gap. The first is to subsidize the device used to get online (possibly a personal computer, possibly a wireless device or some other machine) instead of the monthly service fee. Past experience with telephone subsidies indicates that this is the wise way to approach the problem. Robert Pepper, Senior Managing Director of Cisco Systems Global Advanced Technology Policy, mentioned the problem many low-income consumers have in overcoming a high initial payment:

Take the lesson from trying to get universal phone service: When states were trying to move that needle and get everyone a phone, they ran into a barrier where dropping the prices further made no difference. And what it turned out to be was the \$80 initial connection fee, and not the 10, 12 bucks a month for the service. The device is the parallel for that initial fee.

Participants offered a few possibilities for delivering that subsidy on the device. One consideration is direct government subsidy. Even though Pepper provided anecdotal evidence from an early study involving low-income households and government-provided computers that was successful, worries persisted that low-income users might sell any provided devices for their market value rather than use them. A plan suggested by University of Southern California's Simon Wilkie to get around that possibility was to deliver the subsidy in the form of a leased device whose lease was tied to a two- or three-year service agreement with a broadband provider. The thought was that, if the end-user did not technically own the device, there might be less likelihood for it to "go walking." Yet another intriguing idea is to tie the subsidy program to a push for online secondary and post-secondary education. In that model, the private educational institution would receive partial government subsidy to offer any new students a device on which to take their courses. The device would get out to the consumer, there would be an impetus to purchase a broadband connection, the institution would gain a client, and the consumer would gain education and the increased productivity that accompanies it. Regardless of the method of delivery,

however, it was agreed that the lack of a device was a gating factor to broadband access and one that could be effectively addressed.

Another approach to closing the connection-gap is to seek out innovative ways of driving the demand side of access. Alec Ross, Executive Vice President at One Economy Corporation, proposed a few revenue neutral changes to existing programs that could be emblematic of a wider tactic across many programs:

There's already a \$433 million program in place, the Senior Community Service Employment program, where seniors have to get on the bus and go someplace. What if some of that work could be done from home, via telecommuting? Or consider that we know that the population that is managing chronic disease is disproportionately low-income, Hispanic, or African-American. If we can make a push to educate this segment of the population about getting medical information online, then they have an incentive to adopt the network. Also, they won't have to take the bus three times a week to go get a blood test at the clinic. That's how you get a 65-year-old with a fixed income who lives in subsidized housing to adopt.

Similarly, Scott Wallsten of Technology Policy Institute, suggested that dedicated, ICT-enabled home medical devices could be developed. Such devices could allow diabetics or other blood-test patients to monitor their blood levels at home, all while automatically transmitting that information to their doctor.

The spirit behind such a solution—to make the Internet attractive to people by approaching people where they are right now, in practical ways like telling grandmothers they will not need to take as many cross-town bus trips—has worked in the past. Ross also shared this anecdote, “In 2005, 14% of African-Americans had broadband in their homes, while in 2007, it was 41%. It was not because of last-mile buildouts. It was because African American culture migrated online.”

A variant on that demand-side driven adoption strategy is to eventually migrate certain government services (either aimed at the household or at the business) entirely online. Total migration will have to wait until the entire country has Internet connectivity available geographically, but once that has occurred, it was pointed out at the conference

that non-adopters may change their minds if they are faced with the inconvenience of needing to go to their local library for basic services.

Conference participants recommend that any new funding should be focused on adoption, which may offer more bang for the buck. Ross shared his insight:

Of those people not online in this country, 40% choose not to be, either because they view the Internet as a threat, or because they don't think it has anything of value. Only 19% aren't online because of lack of access or affordability. Because of that, if you focus on adoption over access, your money will take you farther.

However, that does not mean ignoring full deployment. Former Fort Wayne, Indiana Mayor Graham Richard offered a plan for providing universal deployment of local networks that was modeled after the Rural Utilities Service (RUS):

The priorities are unserved areas and key facilities that require especially large amounts of bandwidth, namely local hospitals and governments. If an area claims to have no service and it turns out that they do not have it, there can be a 90-day window for a provider to step up and come in and build a network. Failing that, some grant money will go through to the town, and the town can build it themselves. But the granting agency will be different from the RUS, because RUS was just the bank. This program would also advise on how to get business involved, instead of just being a check-writing arm.

Jeff Brueggeman, Vice President Public Policy for AT&T, also recommended that any federal programs should build on successful broadband initiatives at the state and local level. These initiatives include economic development programs to encourage broadband infrastructure deployment in under-served communities and state funding for increased broadband deployment.

University of Colorado Professor Dale Hatfield, however, stressed the importance of looking beyond the local network:

Often, the problem is not in the local network, but in the backbone. In Colorado, often it is the three or four microwave

tower-hops it takes to get out to the remote town, and not the last mile on cable once you are at the city, that is the disconnect. So, we should not neglect that problem and assume we will have fixed the connectivity issue.

Kathryn Brown of Verizon Communications responded by mentioning that her home state of Virginia had made good headway into that problem with state funding, and Richard also noted a similar program in Indiana. A national survey of statewide network-construction programs would illuminate best practices and could be shared with each state program.

Bolstering ICT Research

After increasing network access, the second goal of the \$10 billion federal budget for ICT advancement is bolstering R&D in the field. The two main ways to encourage research and development of new technologies are through direct laboratory investment, and through creating an economically competitive atmosphere that will drive corporate investment in fundamental research, rather than research and development. Politicians usually like the latter because it is likely to give them a product to point to and claim success even if the program simply crowded out private investment. Basic research, however, is generally harder for the private sector to justify.

The direct laboratory investment could happen in many ways. While much has been made of the demise of the Bell Laboratories, the United States has many other strong research traditions. Scott Wallsten, Vice President for Research and Senior Fellow at the Technology Policy Institute, suggested that there could be ICT-specific opportunities at such institutions as the Sandia, Berkeley, and Livermore National Laboratories:

Take a look at the national labs: What a great resource, but they do not know what they are doing right now. They used to design nuclear bombs, but they do not anymore. And now they do “everything,” and thus nothing. So maybe someone should direct one of them to become an ICT lab.

Professor Michael Katz raised the Defense Advanced Research Projects Agency (DARPA) as a potential location for ICT research.

An economically competitive atmosphere, while not necessarily as prescribable a solution as funding research in a laboratory, is no less possible to bring about. It requires that care be taken in regulation at the FCC, and that the regulators be sensitive to opportunities to either push the ICT industry into a cycle of competitive investment or get out of the way if such a cycle is coming on of its own power.

Yet not all R&D revolves around new technologies. Lauren M. Van Wazer, Chief Policy and Technology Counsel for Cox Enterprises, Inc., observed that, “Considering how much effort goes into the hope for future technologies, perhaps we should also focus on developing new uses for existing technologies that may be flying a little below the radar now.” She suggested Radio Frequency Identification (RFID) as an example of an established technology that could use some development to generate useful applications.

Localized ICT Efforts

The third goal of the \$10 billion ICT budget is to support localized efforts to harness ICT in improving local governance. This cause was especially championed by Graham Richard, whose experience as Mayor of Fort Wayne, Indiana, gives him unique insight into the special realities and challenges of improving truly local governance.

Graham Richard advocates the creation of a so called “professional pork” board for federal ICT innovation grants, similar to the National Institutes of Health (NIH). Instead of depending on lobbyists and their relationships with individual politicians who probably have very little ICT-specific expertise, the funding path for those grants would go through an independent board of professionals. The cities, universities, counties, and states would only be eligible for the grants on the condition that their innovations be made available to the rest of the country, whether they are software applications, best practices or other results.

To obtain the money that will support an application to improve a local situation, there would be an assumption of reciprocation by way of making the application available to be copied. In this way, other local entities would be able to cut costs that might have been spent on privately obtaining the same solutions to the same problem that the first locality solved with its application. Much of this could be achieved using existing tax dollars by reallocating from the appropriate section of the budget

(e.g., a grant for a housing application could come out of the Department of Housing and Urban Development budget.) Such a scenario could also, in the long-run, gradually increase interoperability among the thousands of municipal and local-level governmental entities in the country.

Similar to Graham Richard's proposed RUS-like entity, this board would also advise the grant applicants and recipients, acting as a clearinghouse not only for the federal money, but also for the exchange of ideas generated and supported by each grant. Senators Hagel and Dodd already have a bill gaining traction that could support some of this, and the central role that reforming the earmarking culture has taken recently indicates that such a board could soon be a politically viable entity.

Stimulating Without Any Funds

Considering the size of the current budget deficit, the Conference considered several options where ICT overhaul would be undertaken on a nil budget. A few options surfaced:

Data Collection

The conference focused on two possibilities for low-cost and revenue neutral programs. The first is vastly expanded and improved data collection. Some of those efforts are already being undertaken by states, private interests, and non-profit organizations. While there is almost certainly some overlap in those data sets, it will be a worthwhile task to examine them all and bring them together. But certain remaining data gaps can be closed fairly inexpensively. Until 2003, the Census Bureau asked questions in their annual current population survey about computer and Internet use. In 2007 the Census included a few questions about broadband use. These data are valuable because they can be linked to the socioeconomic and demographic data that the Census collects in the same survey. The participants recommend that those questions remain in the survey.

These data would not only help identify communities with the greatest unmet demand for connections, but would also assist in the efficiency of eventually establishing those connections. In particular, these data would make possible a cost-analysis to determine a beginning figure for the price of making up the 20-30% gap and completing the

national network, making a broadband connection available to every American that would choose to obtain one.

A survey of the privately-used spectrum would also be valuable. This survey could enable the various private interests to identify possible markets for any excess spectrum they may hold the rights to. Also, such a document may be instrumental in demonstrating to certain companies the utility of contracting to share rarely- or lightly-used spectrum with another party. The FCC could serve a coordinating function for any company that might want to lease part or partial use of its spectrum to achieve certain economies of scale.

Removing Roadblocks

After mapping spectrum use, the second goal for low-cost and revenue neutral programs is to remove roadblocks to private parties providing the funding for ICT expansion through business investment. Blair Levin, Managing Director and Telecom and Media Analyst at Stifel Nicolaus, shared his vision for a re-imagined regulatory stance by the incoming FCC Chair:

There are currently about a dozen lawsuits pending between the FCC and the cable industry. There are some new rules that these companies do not like. Presumably, they are only suing because they are unhappy about some of those rules. And, while no FCC chairman could do this, what if, instead of putting out these rules that the companies would not like, he told them that he would offer a trade: He does not enact these rules if they make a deal to go 100% digital by 2007 or 2008. Would there be greater economic growth in the country today? I do not know the answer to that, but everything I do know indicates to me that there would be a lot more investment, from all competitors, and that would help drive growth. And, it would do it without using a penny of government money.

FCC Commissioner Michael Copps agreed, "If the next chairman were to ask that question: What can I do *for* you, instead of *to* you; that might be a conversation to be had."

Another, more specific roadblock that could be lifted is to free up much more spectrum for private availability. The key to this strategy is

to force the government agencies that hold the rights to these large swaths of spectrum to account for all of it, not only in terms of use and need, but also on the balance sheet. This tactic has been very successful in the UK, where it has been implemented by Ofcom.

A variation of this tactic is to consider auctioning off secondary rights to the spectrum allocated to agencies that use it rarely or lightly. This may be a more politically viable option, because the agencies would not be forced to give up their first claims on the spectrum, keeping their options for the future open. Both of these solutions have the added benefit of generating potentially large sums of money.

Spectrum Options

Conference participants discussed other options for freeing up spectrum. The spectrum allocated for broadcast TV is an enormous prize, and the technology using it is ancient; it has been passed by again and again by better systems. Thomas Hazlett, Professor of Law and Economics at the George Mason University School of Law, put it plainly:

The motherlode of spectrum is still the TV band—294 MHz that is reserved for over-air TV broadcasting, a dinosaur of a system. Some bandwidth was freed up by the change to DTV, yet the great bulk of the TV allocations of 50 years ago—294 MHz—remains locked up. Transitioning to a more productive environment can be done only by putting rules in place that have incentives for organizing frequency use more efficiently. The broadcasters should either shift to alternative delivery platforms (like cable, satellite, and broadband), or bunch-up and co-locate their signals. The mechanism for getting this done lies in the market via the issuance of broad overlay rights, not through regulation by the FCC. We've seen year after year, decade after decade that the FCC is not able to get this done.

Such a co-location of signals, while it would not generate revenue for the federal government, would put a great deal of spectrum on the market, which could spur a race by competing ICT companies to invest in new technologies and applications that would operate on that spectrum.

The basic philosophy behind such a move is that upsetting complacency in a market and creating competitive market conditions will drive

investment cycles. Levin described the prime example of this concept with the success of the so-called “Program Access Rules.” By requiring networks offered to cable to also offer carriage opportunities to other media on an equitable basis, these rules allowed for the formulation of the Satellite TV industry. His claim was that, because those rules opened up new avenues for investment, an “asymmetric investment cycle” was born, which drove the existing players in the TV market to innovate and invest in new technology as well.

Robert Pepper, Senior Managing Director for Global Advanced Technology Policy at Cisco Systems, agreed, “Companies invest either offensively or defensively. The positive unintended consequence [of the Program Access Rules] was that, by making cable invest defensively against satellite, they enabled the cable modem, which then forced phone landline companies to invest in DSL.” While Professor Michael Katz was skeptical of banking on “positive unintended consequences” because, as he put it, “most unintended consequences are bad ones,” Hazlett defended the Program Access Rules as a fundamentally pro-competitive decision, “[they] were a success because, fundamentally, they were an enforcement of the 1890 Sherman Anti-Trust Act. It was a fundamentally sound move for the market.”

Universal Service Fund

One other important possible source of revenue is the Universal Service Fund (USF). Originally designed to help the country reach a level of universal telephone land-line service, the fund currently collects over \$7 billion a year. Because land-line telephony is a largely outmoded, yet nowhere near obsolete technology, there is a great debate about what should be done with the money in the fund. Should the country really invest \$7 billion in technology that is more than 100 years old? Although the answer to that question is almost uniformly, “no,” there has yet to be a consensus reached on how to spend the money differently. Levin commented that putting it to better use should be a priority:

One of the fundamental challenges is to change USF from a fund that does not do much to one that actually drives economic growth. Some might want to get rid of it entirely, but the fact is, that is not a real political possibility, so let’s find a way to make it do more for growth than it is now.

Because broadband access is, in many ways, the 21st century equivalent to the connectivity offered by land-line telephony at its peak, many conference participants see applying the USF money for universal broadband access to be a good faith acknowledgement of the original purpose of the fund.

There are several suggestions as to how to repurpose the USF in that way. One such plan is to establish a parallel entity to the existing USF, so that there are two funds. USF “A,” which is the current fund, starts the process with its current balance over \$7 billion, purposed in its current manner. USF “B,” which is the new fund to be dedicated to universalizing broadband access, begins with a zero balance. Every year, however, a significant sum is transferred from “A” to “B,” gradually changing the nation’s ICT funding focus from existing to future networks. One suggested sum was \$1 billion per annum, making it a changeover process which would be completed within the next two Presidential terms. Other plans take place faster or slower, but all of them aim eventually to repurpose the vast sum of money to universalize access in the country to a cutting-edge network. Another focus of these plans is to change the aims of the initiatives funded by the USF from increasing network access to increasing network adoption.

Energy Efficiency and Conservation through ICT

By a great margin, the participants consider ICT’s potential to aid in a transition to a more energy efficient society to be its most important contribution to the quality of life bottom-line. As a philosophical foundation for this stance, participants believe that the most significant environmental challenge today is to reduce worldwide greenhouse gas (GHG) emissions to avoid the most serious effects of climate change. There is a scientific consensus that the first tool in reducing GHG emissions is more efficient use of the energy we produce today. Because of its special ability to maximize supply-line efficiency through instantaneous information availability at all points in the network, the ICT sector has unique opportunities to assist in reducing GHG output and increasing overall energy efficiency.

The vast majority of our potential GHG reductions in the next few decades come from more efficient energy use: efficiency gains will account for more than half of all GHG reductions in the coming 20 to 40 years.

A report from The McKinsey Group breaks down those potential efficiency gainers according to their relative costs of implementation—commercial and residential electronics and lighting are the runaway best bets. Not only do they represent the areas with the biggest potential for efficiency gains, but they are the cheapest to change over, as well. Their negative positions on the abatement curve mean that assuming more efficiency in these categories will actually save money—a lot of money. Clearly, electronic efficiency gains are a goal worth pursuing hotly. Strategies for achieving these gains are outlined below.

Improving the ICT Sector's Energy Efficiency

The conference identified four major areas in which ICT can be leveraged to combat the energy/climate crises. The first is to clean our own house and improve efficiency within the ICT sector. According to The McKinsey Group, the worldwide carbon footprint of server farms alone exceeds that of Argentina, the eighth largest and 30th most populous nation on earth. To provide some background, the ICT sector accounts for about 2% of global GHG emissions, but quite importantly, ICT has a 6% compound annual GHG growth rate, which is approximately four times the growth rate of the base economy. Those statistics include both the carbon output required to manufacture ICT products, or “embedded” GHG, and the operational energy use from plugging the products in.

The goal is to improve the overall GHG impact and energy efficiency in the ICT sector. It is important to note that this does not necessarily mean reducing consumption, because increased ICT consumption may help reduce GHG output or energy use in other sectors by a greater amount. Instead, participants recommend that ICT equipment be designed more efficiently and operated in more efficient manners. Another focus is to improve the disposal and recycling processes for used ICT equipment, because many ICT devices contain heavy metals and other contaminants that make their disposal (and the quickly growing volume of improperly disposed-of devices) problematic.

Conference participants recommend that greater disclosure and measurement of the GHG impact of ICT equipment be made available to consumers. The Department of Energy should promulgate standards for disclosure of the energy consumption and the carbon footprint over the lifetime of ICT devices. Also, the Federal Trade Commission should

take a role in enforcing accuracy and transparency of consumer disclosure. Conference participants also recommend that the new Administration should develop a national strategy of moral suasion to leverage corporate responsibility within the ICT sector, setting a national timetable for adopting these new standards.

This effort to transition to new devices should serve as a cornerstone of the public face of The Initiative, as it would be an ideal opportunity to run public service announcements (PSAs) encouraging adoption of the new technology. As part of this leadership, the government must act as a market and opinion leader by purchasing energy efficient ICT devices. U.S. actions should also be informed by an analysis of global energy costs, to include the tax policy, which should offer tax and other incentives to use clean energy, as well as assigning a price to carbon emissions. This last point is imperative: Progress in this and other sectors relies heavily on internalizing the costs of GHGs for both people and companies.

Using ICT to Impact Other Sectors

The second major area where ICT can contribute in a response to the energy/climate crises is to improve efficiency and consumption rates in other sectors.

One of the most important things for consumers to know is just how much energy they are using and what it costs. The instantaneous fuel-economy readout built into the Toyota Prius has yielded interesting and telling, if anecdotal, evidence that informing the consumer of his or her consumption rate and the accompanying cost will result in more efficient behavior. It has become a fad of certain Prius drivers, who call themselves “hypermilers,” to compete for the best achieved fuel economy. Certainly, our nation, with its past rooted in muscle cars and screeching tires, has never competed before to be the most efficient drivers on the road.

This is not just an empty fluke: It is fundamental economic theory that information is provided if there is a demand for it. Just as high gas prices and the threat of global warming raised the demand for the Prius’s fuel economy readout, high electrical and heating bills can raise a demand for in-home energy-use feedback on the time-differentiated pricing of electrical current, the economical use of which could reduce the peak load on the electrical grid.

ICT has a central role in the architecture and operation of such a “Smart Grid” which can make that feedback possible. Essentially, the “Smart Grid” is an electrical grid like we have now, but with embedded ICT technology that tracks power use and communicates that data to both the utility and consumer in real-time. The communication between the readout unit and the power utility requires only rudimentary technology, running at mere bits per second, so it is certainly feasible.

However, the Smart Grid still faces challenges and questions. For one, its implementation, including real-time differentiated pricing, would be necessary before the nation could adopt a standard of plug-in hybrid vehicles. The load on the Grid would be overwhelming if every car in the country rolled into a garage and plugged in at 5:30 after work. Also, interoperability standards would be necessary, demanding cooperation among our national patchwork of utilities which does not have a perfect record on that score. And it is unsure whether each household should have a central readout unit, or whether one should be built into each appliance, or both.

Conference participants recommend that we modernize electricity consumerism in this country by allowing all interested parties to buy and sell power from wherever they choose. This would demand open interoperability of the Grid, which would provide for communication between diverse sets of energy users and producers, including small producers of energy, such as houses equipped with solar panels or windmills. To accomplish this, a federally mandated timetable (again, perhaps as part of the Initiative’s public face) would be needed to drive private-sector standards for Smart Grid technological adoption.

The government would also need to embrace interoperability standards by way of encouraging a market for energy management devices designed for the consumer-premises. Such standards would be similar to the energy ratings currently mandated for refrigerators, which have been very successful in driving the sales of more efficient devices. Policies will need to be established to deal with the exchange of information from meters, including privacy issues, and incentives should be considered for utilities to actually deploy the equipment. Moreover, there could be tax credits or loan guarantees for both consumers and utilities that consider their peak-load information as well as pure energy usage. For further guidance as to the practicality of implementing these recommendations, interested parties should examine national

and international case studies. For instance, the \$100 million program to turn Boulder, Colorado, into the nation's first Smart Grid city could be looked upon as a national laboratory.

Outside of the home, several participants recommend that a mechanism be adopted to assign a price to GHG emissions, and that similar Smart Grid technology be used to deliver a pricing signal for both energy and GHG. That mechanism may be a cap-and-trade system, or a tax, or some other, revenue neutral idea, but the debate must not end in stalemate and inaction. Assigning a price to GHG is necessary.

Participants also recommend that an ICT clearinghouse, RUS-like program should serve as a conduit for sharing best practices for local governments on energy management through ICT or otherwise. Along similar lines, the group recommends that the government use procurement at both the federal and local (granted through the new ICT clearinghouse) levels as a tool to boost the demand side of the market for "smart" and efficient appliances and equipment.

In the business place, participants recommend that similar efforts be undertaken to induce the deployment and promote the standardization of technologies among "smart appliances," including standards for remote programmability. It is also important to examine existing regulations to determine whether they might function as barriers to "smart" technology deployment.

The last recommendation for ICT impacting other sectors is that, in funding local grant programs, the Federal Government should provide guidance on the use of ICT and require follow-up reporting by local governments. The report should demonstrate that due consideration was given to the ways that ICT could ease the environmental impact of the granted project.

ICT Efficiencies from a Broadband World

The third major area in which ICT can contribute to efficiency in dealing with the energy/climate crises is in the potential of ubiquitous broadband deployment. Such a situation will trigger fundamental economic changes, resulting in increased productivity with associated lessened intensity of energy use and GHG emissions.

One of the fundamental economic changes that has been foreseen in such a scenario is the many possible degrees of dematerialization of cer-

tain sectors of the economy. One convenient example is the process of purchasing a book. In a more dematerialized world, the book would never exist on paper. It would be written, edited, published, and read digitally, and no massive amounts of energy would be exhausted in any phases of the book's existence. No logging equipment would be built or run to cut down the trees. No trucks would be run from the forest to the paper mill to the printer to the bookstore. No bookstore would need to be built or keep its lights on, and the consumer would not need to burn the gas to drive to the bookstore and back. However, that is the extreme case. A more likely scenario (at least for the near future) is that the book will be bought online and delivered from a warehouse via the U.S. post office or private carrier instead of being picked up from the store in a car. Both scenarios, however, represent significant gains in energy efficiency.

Similar to dematerialization is the expanded acceptance of a person's telepresence. This situation cuts down on the energy, GHG, and temporal costs of travel to work or social settings, or traditional shopping locales. Kathryn Brown, Senior Vice President of Public Policy Development and Corporate Responsibility at Verizon Communications, recalled a study that says ICT could cut out 12-15% of GHG emissions by 2020, depending on the availability of high-speed access. She also posited that the GHG savings could be even greater with a faster network. However, Columbia University Professor Eli Noam noted that the creation of a broadband world would further enable remote living, which is inefficient when considering delivery of goods that must always be real, such as food. In fact, ICT may even be complicit in the problem of remote living by enabling telecommuting to one's place of business. However, it is the opinion of the majority of conference participants that telepresence ultimately represents a more energy-efficient model.

Attune Regulation to Its Impact on Energy Issues

The fourth major outlet for ICT to affect the energy/climate is in the reform of ICT regulation. Government should view the ubiquitous broadband platform as a foundation for a more energy efficient economy. In that light, government should encourage the development of innovative applications to drive and encourage ICT usage, and it should permit government and government-regulated legacy delivery systems to be retired.

The consumer benefit from a broadband world may be small at first; the bigger issue is how firms will change the ways they produce, sell, and deliver goods throughout the lifecycle. Because these will be such disruptive technologies, it requires the careful study of this query: Should public and tax policy favor purchases using more energy efficient purchase and delivery channels?

Government must not only lead by using ICT channels to deliver its services, it must also consider the public's true and complete, double bottom-lined interest in its cost-benefit analysis, including the environmental interests, when deciding upon regulation.

Conclusion

The new Administration must look to the future of the economy and the social well-being of the American people with informed, ambitious vision. It must recognize that the transformative capabilities of ICT indicate that an Information Revolution is at hand, and it must reflect the social lessons of the Industrial Revolution in the ICT policies it enacts to deal with this new state of affairs. A ubiquitous, national broadband network has the potential to drive the bettering of both the economic and social welfare of the country for years to come, at a rate of growth that would be otherwise infeasible.

In particular, the economy would benefit greatly from the productivity and efficiency gains that applied ICT can deliver. In addition to the monetary benefits of an improved economy, the primary social betterments would be a drastic reduction in greenhouse gas emissions and the efficient migration of business and governance to an online forum, which would increase access and provide a greater level of service to all.

However, the network is not yet ubiquitous, and the economic and regulatory climate is not currently ideal to undertake its finishing. The new Administration must ensure an economic ecosystem that will foster innovation in ICT applications and new technologies and promote investment in the infrastructure itself to complete the network.

To that end, conference participants recommend that the new President order the Initiative implemented as soon as possible; that funding for research and development in ICT should be increased—and that regulations which create asymmetric, competitive investment

cycles, as well as incentive schemes for companies and private citizens, should be used to drive network deployment and adoption, with the eventual goal of universal connection.

The technologies necessary for this ubiquitous, national broadband network are available, and the time has come to finish building the network's infrastructure and encourage 100% popular adoption. It is time to prepare ourselves, so that every American will be able to enjoy the benefits when the economy and government inevitably migrate to primarily electronic platforms.

APPENDIX

*Leveraging Communications for Economic Stimulus:
Recommendations of the 23rd Annual
Aspen Institute Conference on Communications Policy*

ICT: The 21st Century Transitional Initiative

**Initiative One:
ESTABLISH PRESIDENTIAL LEADERSHIP ON ICT**

***Mission:** “The mission of the Initiative includes three main inter-dependent goals. Because one of the goals is to digitize government service delivery in as many instances as possible, doing so would leverage ICT to improve the performance of government services and to further the reach of existing efforts to address major societal challenges like health care, housing, and education. The second goal is to add or enhance an ICT layer in the internal workings of every government agency that would make it a priority to use ICT in places that have relied on paper technology in the past. This layer would help to ensure that the digitization of government services is performed in an optimal way that is accessible by all. The third goal is to connect to the broadband network the last 20-30% of the population who are currently not connected due to availability or willingness, so that they will be able to access the new, digitized government services.”*

Recommendation A-1. Issue an Executive Order exercising presidential leadership to:

1. Place authority and accountability in a cabinet-level executive: Chief Technology Officer (CTO), who is also Deputy Director of OMB

“...the powers should be vested in the Deputy Director of the Office of Management and Budget (OMB), because of already-vested power over the various departments’ budgets.”

2. Mandate an ICT audit of each cabinet-level department

“The newly minted Chief Technology Officer (CTO), no matter what the title will be, should begin by mandating an ICT audit of each Cabinet-level department and other major agencies, such as the FCC and SEC, to be completed within 100 days of each department’s new leader taking office. The audit should bear in mind the goal of having an “ICT layer” in place in each department. The audit should first explore and define current processes and use of ICT within the department. Second, it should create an inventory of opportunities to add the ICT layer. Third, it should prioritize those opportunities in terms of cost-effectiveness. With the audit of each agency complete, the CTO should convene a high-level interdepartmental working group whose task is to coordinate implementation by identifying possible opportunities for interdepartmental standardization and cooperation in developing the new systems.”

3. Inventory all government spectrum and increase the amount of spectrum available for a variety of uses

- a. Improve spectrum information and planning (inventory all spectrum, develop new 10 year spectrum plan)
- b. Free up government spectrum (implement OMB Circular A11, have a secondary auction on selected government spectrum)
- c. Free up digital broadcast television spectrum for other uses

“One of the first ICT acts of the next Administration should be to appoint an expert to conduct a thorough inventory of all government spectrum: its allocating agency, its designated use, its past and projected future use patterns, its potential value at auction, etc. This information should be gathered into a single, publicly available document.”

“Once the inventory has been taken, a strategy should be put in place to work toward a more efficient model for determining the way the spectrum should be used.”

4. Promote effective coordination of agencies with ICT responsibilities—NTIA, OSTP, DOJ, etc.

“Similar to the way that the internal ICT layers of all the Cabinet agencies should be coordinated through the office of the CTO, the efforts of agencies with external ICT regulatory responsibilities should be coordinated within the Executive Branch.”

“The CTO’s office should also set about generating standards and templates for ICT work across departmental lines.”

5. Effective coordination with business, state/local government, scientific communities (Brain Trust)

“The creation of a council body similar to President Eisenhower’s “Brain Trust”... should be made up of stakeholders from outside the federal government in the various ICT issues, pulling together the best minds from the small business community, large industry, state and local governments, academia, and non-profit entities. Such a council would be able to provide guidance from many learned perspectives outside the insular world of the capitol, ensuring that the policymakers receive input from those who will use, own, operate, and invest in, and depend on the implemented ICT initiatives. Currently, there is a nominatively similar body, the President’s Council of Advisers on Science and Technology (PCAST), but in recent years the PCAST’s focus has narrowed considerably. Roundtable participants envision a broader scope of expertise and interests.”

6. Build public support for ICT solutions and opportunities

7. Pursue national interoperability for public safety first responders

“ICT [should] be employed to give all emergency personnel the ability to interoperate their communications systems with policies in place to limit such communications to the gravest of emergencies.”

Initiative Two:
ECONOMIC STIMULUS AND ICT INFRASTRUCTURE (TELECOM PLAN)

***Mission:** The mission of the Initiative is to use ICT infrastructure programs as a critical component of economic stimulus.*

Recommendation B-1. Increase broadband adoption in the following ways:

- 1. Improve information about broadband adoption (i.e. FCC broadband mapping, bring back broadband use questions on U.S. Census)**

“Some [data collection] efforts are already being undertaken by states, private interests, and non-profit organizations. These data would not only help identify communities with the greatest unmet demand for connections, but would also assist in the efficiency of eventually establishing those connections. In particular, these data would make possible a cost-analysis to determine a beginning figure for the price of making up the 20-30% gap and completing the national network, making a broadband connection available to every American that would choose to obtain one.”

“If we can make a push to educate this segment of the population about getting medical information online, then they have an incentive to adopt the network. Also, they won’t have to take the bus three times a week to go get a blood test at the clinic. That’s how you get a 65-year-old with a fixed income who lives in subsidized housing to adopt.”

- 2. Transfer Universal Service Funds from voice support to broadband support (create more targeted, efficient mechanisms)**

“There are several suggestions as to how to repurpose the USF in that way. One such plan is to establish a parallel entity to the existing USF, so that there are two funds. USF “A,” which is the current

fund, starts the process with its current balance over \$7 billion, purposed in its current manner. USF “B,” which is the new fund to be dedicated to universalizing broadband access, begins with a zero balance. Every year, however, a significant sum is transferred from “A” to “B,” gradually changing the nation’s ICT funding focus from existing to future networks. One suggested sum was \$1 billion per annum, making it a changeover process which would be completed within the next two Presidential terms.”

3. Subsidize device and/or service bundles to low income persons

“...subsidize the device used to get online (possibly a personal computer, possibly a wireless device or some other machine) instead of the monthly service fee. Past experience with telephone subsidies indicates that this is the wise way to approach the problem.”

4. Target funds to unserved areas

5. Target funds to key facilities (to serve as anchor tenant for broadband upgrade)

“The priorities are unserved areas and key facilities that require especially large amounts of bandwidth, namely local hospitals and governments.”

6. Target funds for backhaul access (create program in which communities or BSP providers can apply for grants or loans to build our “middle mile” backhaul networks).

Recommendation B-2. Increase spending on ICT-related basic research and development

- 1. Survey basic research related to ICT**
- 2. Increase or refocus budgets of DARPA, NSF, NIST, National Labs**
- 3. Focus work of a national lab on ICT**

“The two main ways to encourage research and development of new technologies are through direct laboratory investment, and through creating an economically competitive atmosphere that will drive corporate investment in fundamental research.”

Other Related Steps:

1. Implement further studies (US Government Programs and Expenditures, international practices, Right Of Way best practices, etc.)
2. Remove legal and regulatory roadblocks
3. Remove right of way roadblocks.

Initiative Three: ICT, ENERGY AND THE ENVIRONMENT

Mission: *The mission of the Initiative is to use ICT to serve a double bottom line where possible. Energy efficiency and environmental stewardship are prime examples.*

“Participants believe that the most significant environmental challenge today is to reduce worldwide greenhouse gas (GHG) emissions to avoid the most serious effects of climate change. There is a scientific consensus that the first tool in reducing GHG emissions is more efficient use of the energy we produce today. Because of its special ability to maximize supply-line efficiency through instantaneous information availability at all points in the network, the ICT sector has unique opportunities to assist in reducing GHG output and increasing overall energy efficiency.”

Recommendation C-1. Improve efficient energy use and carbon impact within the ICT sector

- Improve energy efficiency of ICT equipment
- Improve disposal and recycling of used equipment

Policy Recommendations:

1. Offer more information to consumers and businesses about energy consumption and GHG impact of equipment

“Department of Energy should promulgate standards for disclosure of the energy consumption and the carbon footprint over the lifetime of ICT devices. Also, the Federal Trade Commission should take a role in enforcing accuracy and transparency of consumer disclosure.”

2. Develop a national strategy of moral suasion to leverage corporate responsibility within ICT sector

“This effort to transition to new devices should serve as a cornerstone of the public face of The Initiative, as it would be an ideal opportunity to run public service announcements (PSAs) encouraging adoption of the new technology.”

3. U.S. should offer tax and other incentives to use clean energy

4. Government should be a leader in purchase of energy efficient ICT devices

5. Congress should assign a price to carbon emissions

“This last point is imperative: Progress in this and other sectors relies heavily on internalizing the costs of GHGs for both people and companies.”

Recommendation C-2. Use ICT to improve efficiency and consumption in other sectors

- In the residential sector, consumers should know how much energy they are using
- ICT has central role in “Smart Grid” architecture and operation

Policy Recommendations:

1. Bring the internet economy to the electric power grid—open interoperability, linking Smart Homes to the Smart Grid

“It is fundamental economic theory that information is provided if there is a demand for it. Just as high gas prices and the threat of global warming raised the demand for the Prius’s fuel economy readout, high electrical and heating bills can raise a demand for in-home energy-use feedback on the time-differentiated pricing of

electrical current, the economical use of which could reduce the peak load on the electrical grid. ICT has a central role in the architecture and operation of such a “Smart Grid” which can make that feedback possible. Essentially, the “Smart Grid” is an electrical grid like we have now, but with embedded ICT technology that tracks power use and communicates that data to both the utility and consumer in real-time.”

“The government would also need to embrace interoperability standards by way of encouraging a market for energy management devices designed for the consumer-premises. Such standards would be similar to the energy ratings currently mandated for refrigerators, which have been very successful in driving the sales of more efficient devices.”

2. Establish a mechanism for assigning a price to carbon emissions

“Outside of the home, several participants recommend that a mechanism be adopted to assign a price to GHG emissions, and that similar Smart Grid technology be used to deliver a pricing signal for both energy and GHG. That mechanism may be a cap-and-trade system, or a tax, or some other, revenue neutral idea, but the debate must not end in stalemate and inaction. Assigning a price to GHG is necessary.”

3. Create a clearinghouse for best practices for local governments on energy management and ICT

4. Promote standards for communications among “smart appliances,” and incentivize their deployment

“Along similar lines, the group recommends that the government use procurement at both the federal and local (granted through the new ICT clearinghouse) levels as a tool to boost the demand side of the market for “smart” and efficient appliances and equipment.”

Recommendation C-3. Promote efficiencies that derive from a pervasive, ubiquitous broadband platform

“The third major area in which ICT can contribute to efficiency in dealing with the energy/climate crises is in the potential of ubiquitous broadband deployment. Such a situation will trigger fundamental economic changes, resulting in increased productivity with associated lessened intensity of energy use and GHG emissions.”

“The consumer benefit from a broadband world may be small at first; the bigger issue is how firms will change the ways they produce, sell, and deliver goods throughout the lifecycle. Because these will be such disruptive technologies, it requires the careful study of this query: Should public and tax policy favor purchases using more energy efficient purchase and delivery channels?”

Recommendation C-4. Improve governmental and regulatory approaches

- FCC, state and local regulators should include impacts on energy use and climate change in the public interest analysis of their policy decisions
- Government must be a leader by using ICT channels to deliver its services.

Leveraging Communications: ICT as Economic Stimulus

A Plan for the Next Administration

*Scott Wallsten**

Overview

Information and Communications Technologies have become an increasingly important component of the U.S. and global economies. High-speed Internet, or broadband, connections are an integral part of ICT today, connecting residences, individuals, and businesses to the Internet. Conventional wisdom holds that the broadband infrastructure in the U.S. lags far behind that in other advanced countries and that a national broadband policy is desperately needed to help the U.S. catch up.

Conventional wisdom, however, is incorrect.¹ In fact, broadband infrastructure in the U.S. compares quite favorably to that in other OECD countries and is improving rapidly. The generally good state of broadband gives us the freedom to approach broadband policy carefully and evaluate proposals rigorously to ensure that policies yield the largest possible net benefits. In this paper I briefly explain the true state of broadband in the U.S. and advance several policy proposals for the next Administration. In particular, the next Administration should:

- Collect better data on residential broadband through surveys conducted by the Census Bureau and on business broadband through surveys conducted by the Bureau of Economic Analysis.
- Continue to remove barriers to entry by new broadband platforms. For example, continue to make more spectrum available for high-value uses through unencumbered auctions.

* Vice President for Research and Senior Fellow, Technology Policy Institute. I thank Stephanie Hausladen for excellent research assistance. Any mistakes in the paper are my own. The views expressed here are mine and are not necessarily those of any institutions with which I am affiliated.

1. See Wallsten (2008) for more details on the information presented in this paper.

- Focus policy on low-income people rather than on rural areas. For unserved rural areas, consider innovative programs such as the reverse auction recently implemented by West Virginia.
- Require a cost-benefit analysis of any major regulatory proposal to maximize the probability that it will yield net benefits.
- Conduct retrospective analysis: inventory and evaluate the myriad state and federal broadband programs that already exist so we can learn what works and what does not.

The State of Broadband in the U.S.

In April 2008 about 55 percent of U.S. households had broadband connections (Horrigan 2008), up from 51 percent six months earlier (National Telecommunications and Information Administration 2008). Figure 1 shows that the U.S. has approximately the same household penetration rate in Japan, and higher than in France, the U.K., and Germany. Korea is the only large OECD country with a higher household penetration rate. While Figure 1 shows the growth in overall household penetration, Figure 2 shows growth in the number of counted connections as of June 2007, the most recent data available from the FCC. Most impressive is the very fast growth in mobile broadband connections, which had reached 35 million by that date.²

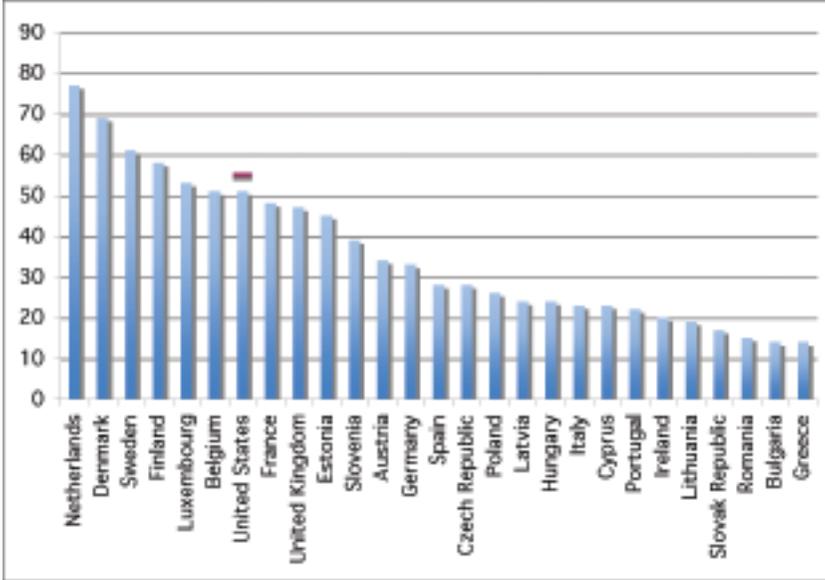
2. These figures may be surprising in light of the oft-reported OECD rankings, which put the U.S. 15th in connections per capita. That ranking is flawed. First, it is impossible to count most business connections in the U.S. because businesses generally connect over special access lines. Data from the Census Bureau and the Nielsen Company together suggest that both the OECD and the FCC counts miss approximately 72 million workplace connections.

Second, connections *per capita*, which is how the OECD bases its rankings, is an inappropriate measure when each household will have only one connection regardless of the number of people who live in the house. And because each household needs only one wired connection, countries with larger households, like the U.S., Japan, and even Korea, will ultimately have fewer connections per capita than will countries with smaller households, like Norway and Denmark. In other words, because more people share each connection in countries with larger households, those countries will have fewer connections per capita even if households are connected.

In short, the change in per capita broadband rank is a statistical anomaly having to do largely with differing household sizes across countries, not with broadband investment or policy.

Figure 1
Household Broadband Penetration

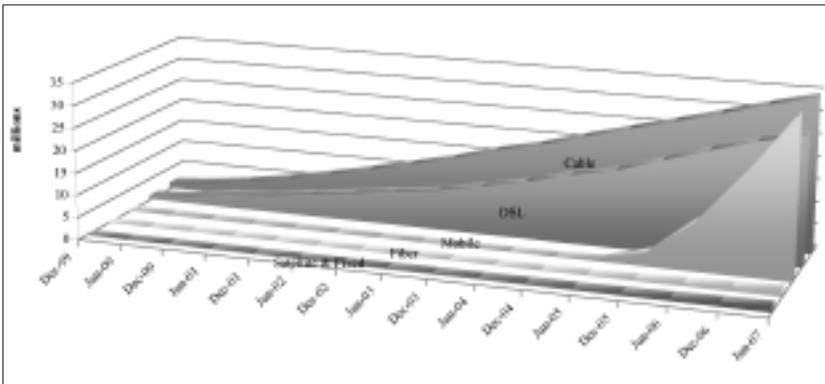
all data from November-December 2007 unless otherwise stated



Source: Data for Europe from European Commission (2008), for the U.S. from Horrigan (2008) and the National Telecommunications and Information Administration (2008), for Japan from Shibatani (2007), and for Korea from the National Internet Development Agency of Korea (2008).

Figure 2
Total Counted High-Speed Connections in the U.S.

at least 200 kbps in at least one direction

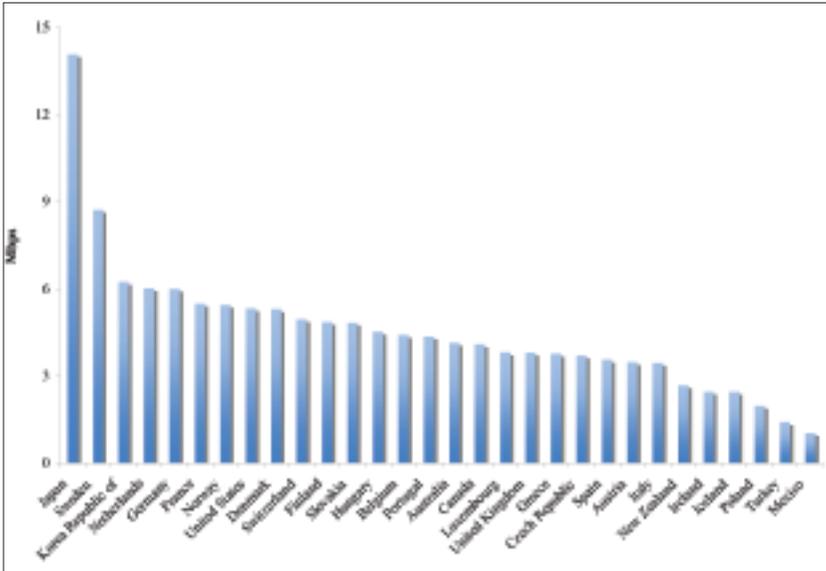


Source: Federal Communications Commission (2008).

Connection speeds in the U.S. are also increasing and generally comparable to other advanced countries. Figure 3 shows the average tested actual, as opposed to advertised, speeds across OECD countries. Japanese connections are by far the fastest, but are not close to the advertised rates of 100 Mbps.

These data do not show that the market is perfect, that the U.S. leads the world, or that government has no role. Instead, the data show us that we are not falling behind other countries and can afford to take the time to carefully consider new policies that will affect this critical infrastructure. I discuss useful policies in the next section.

Figure 3
Average Tested Download Speeds
2007-2008



Source: Speedtest.net

Note: Data for Korea probably understate average connection speeds there because Speedtest.net does not have a testing server in that country. As a result, the average speed includes delays caused by international congestion.

A National Broadband Policy

First, obtain good data. It is not possible to make good policy without good data, and reliable data on broadband are scarce. There is broad agreement on this point, but policy proposals have focused so far on mapping and counting, which are at best only part of the solution. Good data for evaluating policy will also come from surveys.

In 2007 the U.S. Census included questions about broadband in its annual Current Population Survey (CPS). Not only does this survey provide us with useful information on connections per household, it allows us to match broadband information to geographic and demographic variables.

This survey has other advantages, as well. First, because the Census already conducts the CPS, the marginal cost of including additional questions on broadband is small. Second, it requires no cooperation from broadband providers, who are reluctant to provide the FCC with additional data. We should encourage the Census to continue including its valuable questions on broadband in this survey in the future.

In addition, we know little about business broadband. To this end, the Bureau of Economic Analysis, which already collects vast quantities of business and productivity data, may be able to gather broadband data useful for policy.

Second, perform cost-benefit testing on any major proposal. Resources are finite, and money used for one initiative is not available for another. Indeed, every regulatory agency that is part of the executive branch must show what problem a rule is intended to solve and that the proposed regulation is likely to yield net benefits to society. Given the importance of the Internet, proposals likely to affect this dynamic sector must be given the same rigorous scrutiny.

Third, because competition is key to continued investment and innovation, continue to remove barriers to entry by new broadband platforms. That means, for example, continuing to make spectrum available for high-valued uses.

It is well established that the lack of available spectrum is a barrier to entry for potential new wireless providers and to existing wireless firms that want to expand and improve their services. The \$19 billion spent by companies for spectrum in the 700 MHz auction, which concluded in March 2008, reveals the relative scarcity of useable spectrum. The growing demand for wireless services makes it increasingly important to make more spectrum available.

Fourth, focus on low-income people rather than on rural areas. The 2007 Census data show us that while a rural-urban adoption gap exists, the income gap is much larger/more serious. Eighty percent of households with annual incomes of at least \$100,000 have wired broadband, while only 35% with incomes of \$35,000 or less subscribe.

Low-income people would surely be better off with cash rather than a broadband subsidy, but if the policy goal is to increase adoption, then focusing on connecting low-income people rather than rural areas is likely to be more effective.

To the extent that some rural areas may be underserved, consider a new initiative in West Virginia. Under a new law, a provider can apply for a subsidy to build broadband infrastructure in an unserved area. After the application is submitted, other companies have 60 days to also submit applications. The state can then award a grant to the firm that requests the smallest subsidy. This reverse auction has the advantages of using a market mechanism to reveal the true minimum subsidy sufficient to attract investment in an unserved area while also not benefiting any particular provider.

Fifth, inventory and evaluate existing state and federal programs intended to promote broadband.³ Little empirical research has been done on the range of existing broadband policies. Flamm (2005) found that the eRate program, intended to help connect schools and libraries to the internet, had little effect on broadband penetration.⁴ Wallsten (2006) found that few state-level policies had any impact on broadband penetration.

USDA Rural Development, for example, reports that by the end of 2006 it had “invested \$5.7 billion to provide high-speed Internet access to more than 1.9 million rural homes and businesses,” according to its 2005-2006 annual report (Rural Development 2007). No research has tried to determine whether those subsidies were, in fact, required, or if those connections would have been built anyway. Moreover, by the agency’s own report, it spent about \$3,000 per connection if we assume that none of the funds supported projects that would have been done anyway. Is that cost-effective for those areas?

3. See http://docs.cpuc.ca.gov/published/COMMENT_DECISION/43588.htm for a list of some state-level broadband policies.

4. This result should, perhaps, not be surprising since the Universal Service Program overall seems to have had little effect on telephone penetration (Rosston and Wimmer 2000).

Before proposing new policies the government should know what has already been implemented, and carefully study what has and has not been effective.

Conclusion

Despite conventional wisdom, the U.S. broadband infrastructure is in good shape overall. However, government and policy are crucial in ensuring adequate investment and promoting competition. Because there is no crisis, we can think through policies carefully to ensure that they do the most good and provide help where it is actually necessary. By gathering good survey data, evaluating existing policies, promoting competition, and conducting cost-benefit analyses, we can ensure that broadband will continue to enhance productivity and promote economic growth.

References

- European Commission. June, 2008. "E-Communications Household Survey." *Eurobarometer*.
- Federal Communications Commission. March, 2008. "High-Speed Services for Internet Access: Status as of June 30, 2007." Washington, DC.
- Flamm, Kenneth. September, 2005. "The Role of Economics, Demographics, and State Policy in Broadband Availability." *LBJ School of Public Affairs: Austin, TX*.
- Horrigan, John B. July, 2008. "Home Broadband Adoption 2008." Pew Internet & American Life Project.
- National Internet Development Agency of Korea. February, 2008. "Survey on the Computer and Internet Usage." Ministry of Information and Communication.
- National Telecommunications and Information Administration. January, 2008. "Networked Nation: Broadband in America 2007." United States Department of Commerce: Washington, DC.
- Rosston, Gregory and Bradley Wimmer. 2000. "The 'State' of Universal Service." *Information Economics and Policy*, 12:3, pp. 261-283.
- Rural Development. 2007. "2005-2006 Progress Report." United States Department of Agriculture: Washington, DC.
- Shibatani, Daisuke. July, 2007. "Internet Penetration and Usage in Japan." IMPRESS R&D/Internet Media Research Institute.
- Wallsten, Scott. 2006. "Broadband Penetration: An Empirical Analysis of State and Federal Policies." Washington, DC.
- "Understanding International Broadband Comparisons." *Technology Policy Institute Working Paper*: Washington, DC. May 2008.

ICT & the Economy: Creating a Double Bottom-Line

Alec Ross

Federal government policy discussions focused on information and communications technology (ICT) almost invariably address the issue vertically, addressing ICT as a stand-alone set of policies tied to network deployment and adoption (such as the Universal Service Fund) or as 21st-century administrative tools delivering 20th-century government programs.

The next Administration's greatest opportunities to leverage ICT to stimulate the economy will not come from thinking about technology vertically, such as subsidizing the deployment of an advanced network, but in looking horizontally—adding a broadband and applications layer to existing federal programs targeted to vulnerable populations receiving government social services. This will produce a double bottom-line.

In addition to the economic benefit resulting from network deployment and adoption, it can produce upward economic mobility and self-sufficiency within targeted populations such as seniors, veterans and workers displaced by trade. This second bottom-line can have an economic development impact far greater than the benefit of the network deployment and adoption itself. This paper will demonstrate how horizontal integration of ICT has improved state-level affordable housing policies and provide examples of federal policies that could benefit from similar thinking.

Case Study: Modernizing Affordable Housing

Broadband's double bottom-line has already been demonstrated with affordable housing finance policy at the state level through One Economy Corporation's *Bring IT Home* campaign which leveraged affordable housing finance policy to both stimulate broadband deployment and adoption as well as increase upward economic mobility among the residents.

The original charter of government subsidized housing programs was to provide safe, fit and affordable housing which would provide a platform for people to develop economic self-sufficiency. Since the

1960s, this mission has degraded into more of a series of safety net programs, keeping families from becoming homeless and forestalling the spread of the most severe forms of urban decay. Not surprisingly, the 12.5 million Americans who live in government subsidized affordable housing are historically among the Americans least likely to be online.

One Economy utilized affordable housing finance policy as an opportunity to look at ICT policy horizontally, at once a series of programs that not only could facilitate network deployment and adoption where it was otherwise not happening, but also as an opportunity to provide access to tools and online content without which the young people growing up in these economically depressed communities will not be competitive in America's increasingly technology-rich, knowledge-based economy. Coincidentally, by bringing broadband into subsidized housing, the second part of the double bottom-line helps achieve the original economic self-sufficiency mission of affordable housing policy.

Through the *Bring IT Home* campaign, One Economy Corporation succeeded in changing affordable housing finance policies in 42 states. In these areas, developers are now building "21st-century affordable housing" units with dedicated broadband networks built in as a universal design standard and with the recurring Internet service costs built into the housing's operating costs. The policies adopted under *Bring IT Home* requested no new funding, but instead worked through existing housing programs, in particular the Low Income Housing Tax Credit program (\$12 billion housing production annually), to ensure that new and substantially rehabilitated housing is equipped with broadband infrastructure and service.

In 2005 alone, *Bring IT Home* helped to bring broadband into the homes of an estimated 200,000 low-income Americans. These families received layers of benefits in addition to a tool that assists with upward economic mobility. Among other things, parents are finding more affordable health care; their children are extending their education outside the classroom. Rethinking affordable housing policies allowed states to increase broadband penetration while simultaneously multiplying the benefits for families in need.

To be successful in the 21st century, federal programs need a similar process of modernization and digitization, through which ICT policy is applied horizontally.

Opportunity for Workers Displaced by Trade

Today, as part of the Trade Adjustment Assistance Program, workers who lose their jobs as a result of increased imports or shifts in production out of the United States are able for as much as \$1,250 for training and as much as \$1,250 in relocation expenses.

This program's 20th-century logic fails to capitalize on modern day opportunities. When a consumer electronics factory closed because of a free trade agreement with Japan, it made sense to help those displaced workers get the training and move to a place with more job opportunities. But this program assumes that jobs are tied to a specific place, when many employees are now eligible to telecommute. We spend \$837 million each year on a program that is meeting the demands of yesterday.⁵

For the same \$2,500, that unemployed worker could get a computer, software, and home office equipment, as well as broadband at home for two years.⁶ Rather than training an employee for a job far away, further draining the local economy, we can train that individual for a job that can be done at home. These funds could also be used to flood economically distressed areas with broadband, attracting new businesses that will employ local workers. Subsidizing broadband creates more opportunities for training, a broader range of jobs the worker can seek, and greater flexibility.

Here, the double bottom line is clear: by rethinking the needs of people and communities struggling with the effects of globalization, the Trade Adjustment Assistance program can relieve immediate economic distress and create lasting value for workers.

Better Healthcare for the Chronically Ill

Rising health care costs and an aging population are placing enormous financial strain on our health care system. Total Medicare expenditures are expected to rise faster than either worker's earnings or overall economic growth; over the next 75 years, expenditures are expected to increase from

5. U.S. White House. Office of Management and Budget. *Detailed Information on the Trade Adjustment Assistance Assessment* ExpectMore.gov. 29 Jan. 2008. Available online: <http://www.whitehouse.gov/omb/expectmore/detail/10000340.2007.html>.

6. Based on the average U.S. broadband subscription price of \$53.06. See "Broadband Prices" in OECD Broadband Statistics. 2007. Available online: www.oecd.org/dataoecd/22/44/39575002.xls.

3.1 percent to 11.3 percent of GDP.⁷ Our inefficient methods of caring for chronically ill patients bear much of the responsibility—accounting for at least 78 percent of all health care expenditures.⁸ As these costs climb, we must consider how ICT can cut costs and improve care.

The Department of Veterans Affairs' chronic care program provides a positive example for implementing telemedicine. In 1996, Congress made nearly all veterans eligible for Veterans Health Administration (VHA) care. This, coupled with the large number of servicemen and women returning from Iraq, has placed enormous strain on the VHA. Telemedicine has improved the VHA, moving much of the care into the home, where the patients can manage their own care.⁹ Doctors monitor systems through broadband access; the patient need only visit the doctor for serious problems—cutting down on hospital visits and expenses, while simultaneously improving the patient's quality of life.

Although Medicare and VHA are administered very differently, one study estimates that enacting a similar chronic care program for the highest-risk 4 million participants in Medicare could prevent 1.7 million hospitalizations and produce net savings of over \$30 billion.¹⁰ To make that savings a reality and achieve the double bottom-line broadband offers, Medicare must provide an incentive for insurance providers to invest in cost-saving ICT.

Employment Opportunities for the Elderly and Disabled

Current programs overlook how ICT makes it easier for the elderly and disabled people who are struggling with rising health care and a declining economy to continue working. There are a number of useful services elderly and disabled people—with a range of skill levels—could

7. 2007 Annual Report of the Board of Trustees of the Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Fund. 2007. Available online: <http://www.cms.hhs.gov/reportstrustfunds/downloads/tr2007.pdf>.

8. Information Technology Association of America (ITAA), 2004. *Chronic Care Improvement: How Medicare Transformation Can Save Lives, Save Money, and Stimulate an Emerging Technology Industry*. An ITAA E-Health White Paper: A Product of the ITAA E-Health Committee, May.

9. Ziegler, Mollie. "VA Health Care: More Patients, Shrinking Staff." *Federal Times* (2003). Available online: <http://www.visn8.med.va.gov/visn8/v8/clinical/cccs/articles/FedTimesVAHealthCare.doc>.

10. *Ibid.*

provide from their homes using broadband. Some innovative companies like Jet Blue allow most of their telephone support employees to work from home. If the federal government were to take similar steps, it could employ tens of thousands of elderly people and train others for employment with private firms that might otherwise send call centers overseas.

The Senior Community Service Employment Program (SCSEP) spends \$433 million annually to provide subsidized, part-time training for low-income persons age 55 or older who have poor employment prospects.¹¹ However, the jobs we train these seniors to do still require them to commute to work. As a result, even seniors who are able to use the training to find private, full time, unsubsidized employment could find themselves unemployed again as their mobility declines. By restructuring the SCSEP to take advantage of employment opportunities that broadband creates, such as the growing market for virtual assistants, we can begin to provide longer term employment prospects for the elderly.

Currently, 65 percent of senior citizens do not use the Internet.¹² By training the elderly and disabled workers in ICT, we increase productivity and improve their quality of life—all while growing the demand for broadband in a demographic that has traditionally not seen its value.

Re-adjustment Assistance for Veterans

Veterans returning from combat have difficulty reentering the American economy, particularly younger servicemen and women. Since the war in Iraq began, the unemployment rate among young veterans has fluctuated between 2 percent and 7 percent higher than the general unemployment rate among youth, at one point reaching 15.6 percent.¹³ Finding ways to become productive members of the econo-

11. U.S. White House. Office of Management and Budget. *Detailed Information on the Community Service Employment for Older Americans Assessment* ExpectMore.gov. 29 Jan. 2008. Available online: <http://63.161.169.137/omb/expectmore/detail/10000328.2003.html>.

12. Horrigan, John B. *Home Broadband Adoption 2008*. Pew Internet and American Life Project. Washington D.C.: Pew Internet, 2008. Available online: http://www.pewinternet.org/pdfs/PIP_Broadband_2008.pdf.

13. Savych, Bogdan, Jacob A. Klerman, and David S. Loughran. Recent Trends in Veterans Unemployment as Measured in Current Population Survey and the American Community Survey. RAND Corporation. Available online: http://www.rand.org/pubs/technical_reports/2008/RAND_TR485.pdf.

my is particularly hard for disabled veterans. Broadband provides an opportunity for the disabled veterans to regain control in their lives.

The Department of Veterans Affairs is already using telehealth technology to help ease the strain on the veteran's health care system. As it continues to develop its telehealth program, more veterans who have limited mobility will need in-home broadband to manage their health. The federal government provides a number of programs for veterans with service-related disabilities. Between the Veterans' Employment and Training State Grants,¹⁴ the Vocational Rehabilitation and Employment Program¹⁵ and the Independent Living Program,¹⁶ the government spends over \$1 billion a year trying to help wounded veterans rebuild their lives. The Department should apply broadband and an application layer to provide economic assistance and job training as it has in health care.

Broadband has already proven itself as a powerful tool for disabled veterans. The Purple Heart Foundation trains disabled veterans to man call centers, a job they can do from a broadband-enabled home. As more veterans need assistance readjusting to civilian life, the Department of Veterans affairs should use ICT to scale this effort to reach more veterans—increasing broadband deployment, addressing the immediate needs of returning servicemen and women, and generate resources and skills veterans can benefit from for years to come.

Conclusion

The federal government can no longer afford to isolate ICT policy as a vertical issue. The policy proposals outlined above are a small selection of the opportunities that can be created when government starts incorporating ICT programs into existing efforts. Programs at all lev-

14. U.S. White House. Office of Management and Budget. *Detailed Information on the Veterans' Employment and Training State Grants Assessment* ExpectMore.gov. 29 Jan. 2008. Available online: <http://www.whitehouse.gov/omb/expectmore/detail/10003907.2005.html>.

15. U.S. White House. Office of Management and Budget. *Detailed Information on the Vocational Rehabilitation and Employment Program Assessment* ExpectMore.gov. 29 Jan. 2008. Available online: <http://www.whitehouse.gov/omb/expectmore/detail/10003220.2006.html>.

16. U.S. White House. Office of Management and Budget. *Detailed Information on the Independent Living Program Assessment* ExpectMore.gov. 29 Jan. 2008. Available online: <http://www.whitehouse.gov/omb/expectmore/detail/10002146.2004.html>.

els—from \$10 million initiatives to \$10 billion programs—can increase their value, stimulate the economy and increase the demand for broadband. It is time to make telecommunication policy a key consideration in across domestic policies, making ICT's double bottom-line a reality for millions of Americans.

An Essay Constituting One of the Many Reasons Why the U.S. Congress would not Solicit Advice from Michael Katz about Spending the Money

Michael Katz

Ten billion dollars have been set aside as part of an economic stimulus package, and we have been assigned to design a policy that can most effectively and efficiently use Information and Communications Technology (ICT) to stimulate economic growth. Now what?

A first task is to determine the specific objectives of the mandate. There are several possibilities. Should the spending be undertaken to serve as a short-run macroeconomic stimulus intended to offset the effects of the bursting of the housing bubble and the accompanying turmoil in financial markets? Or should the aim be to promote long-run growth by stimulating investment, particularly in research and development (R&D)? Or perhaps the availability of ten billion dollars represents a chance to address important social problems for which ICT can potentially serve as a significant component of the solutions. It is useful to consider each in turn.

Begin by examining the potential use of ICT to stimulate the economy in the short run. There are at least two broad approaches. One is to encourage investment in ICT, and the other is to encourage consumption of ICT services. And each of these broad approaches itself has two major variants. One relies on direct government spending (*e.g.*, creating a collection of federally owned and operated metropolitan Wi-Fi networks), while the other operates by creating broad private-sector financial incentives (*e.g.*, tax breaks for the installation of fiber optic links into residences).

The pursuit of large, government-funded infrastructure projects is unlikely to be effective for at least two reasons. First, putting such government programs in place would very likely take far too long to address the current macroeconomic downturn. Large infrastructure projects typically take years to plan and/or begin awarding construction

contracts. Moreover, there are ample grounds for suspecting that any such programs would be victims of pork barrel politics. Fiber can go nowhere just as well as a bridge can. Lastly, there is a question of which economies would be stimulated. To the extent that much or most of the ICT equipment was produced in foreign countries, large-scale ICT infrastructure projects might tend to do relatively little to stimulate the domestic economy. Stated another way, any multiplier effects associated with spending on ICT equipment might be relatively small.

These factors suggest that, if an attempt is going to be made to use ICT spending as a short-run macroeconomic stimulus, then tax cuts—rather than new government spending programs—would probably be the more timely and effective way to go. For example, tax breaks could be created to give people financial incentives to purchase from domestic web sites.

If ICT does not look particularly promising as a source of short-term stimulation, then perhaps ICT has a greater role to play in promoting longer-term growth. ICT investment manifestly has been an important contributor to long-run productivity growth, and ICT serves as extremely important infrastructure for the rest of the economy. A critical question for government policy, however, is (or at least should be) whether it makes sense to focus on ICT at the expense of other sectors of the economy. The answer does not depend on whether ICT investments are valuable. Rather, a central issue is whether there are sound reasons to believe that there is a greater divergence between the private returns to ICT investments (which motivate the parties making those investments) and the social benefits that are generated by ICT investments. For example, economic studies have found that the social returns to R&D investment are typically much greater than the private returns, which suggests that there may be too little R&D investment from a social perspective. But is this ratio larger or smaller for ICT than agriculture, energy, or biotechnology? It would be very valuable to answer this question before promoting ICT R&D at the expense of promoting R&D investment in other sectors.

Basic research (*e.g.*, fundamentals of semiconductors or principles of large-scale software development) is an area within ICT in which there are reasons to believe that spillovers are particularly large. Hence, this is an area in which it is most likely to make sense to subsidize research, either through tax breaks or direct grants. If government research

grants are the chosen vehicle, then it would be useful to assess whether the “big science” approach (i.e., a preference for research programs with extremely expensive infrastructure) often favored by government grant-making agencies in recent years is the best one for ICT.

Lastly, whether or not the policies are intended to address short- and long-run macroeconomic conditions, the policies could be used to promote ICT as part of the solution to important social problems. There is certainly no shortage of problems.

Global warming is arguably the most pressing problem of our time. ICT can potentially result in a much more carbon-efficient economy. ICT can play a role in promoting buildings that use automation to reduce energy consumption, electric power grids that entail smaller transmission losses, and more fuel efficient automobile engines. ICT can also facilitate real-time power pricing and the use of intelligent agents that allow businesses and households to respond to economic signals about energy costs, with resulting efficiency improvements. In addition to being vitally important, global warming is an attractive issue to address through government policies because it involves very large externalities.

Telecommuting is an activity that generates positive externalities by reducing both greenhouse gas emissions and road congestion. Given the failure to set prices for congestion and the harm caused by greenhouse gases and other pollutants, the private cost of driving is far below the social cost. If Americans were committed to reducing global warming, we would tax carbon emissions (say by raising the federal excise tax on gasoline) to bring the private and social cost in line with one another. Given the lack of political will, second-best policies seek to lower the private costs of socially less costly substitute activities, such as telecommuting.

Although policy makers would almost certainly lack the courage to address it, there is—from an efficiency perspective—an issue whether people who live very far from their employers (say rural residents working in a city) should be eligible for subsidies. The argument against eligibility is that, by making living in rural areas cheaper or more convenient, these programs would promote an environmentally hostile lifestyle. As long as rural lifestyles remain so much less energy efficient than urban lifestyles, one can make an economic and moral case that public policy should discourage rural living, not subsidize it or other-

wise make it more desirable. These are complex issues. It could be valuable to take a small part of the ten billion dollars to fund a study to determine whether subsidizing rural telecommuting would, in the long run, increase or decrease carbon emissions.

Consideration of congestion leads to another area in which ICT could play a role in addressing a social problem where large externalities are involved. Given the current state of technology, it would be possible to have intelligent automobiles that communicated with each other and with the highway system in ways that would greatly reduce accidents and congestion, while dramatically increasing average driving speeds and highway capacity. However, these systems are effective only if a significant percentage of automobiles are suitably equipped. Hence, there are significant adoption externalities, which raises the possibility of useful subsidies.

A final transportation application of ICT to consider is the air traffic control (ATC) system. Attempts over the past years to upgrade ATC ICT have reportedly wasted billions of dollars. If a few more billion would make the difference, then this might well be a sound infrastructure investment. Air traffic delays have been estimated by the federal government to cost the U.S. economy over 40 billion dollars per year. As an alternative, or in addition to, spending money on equipment, one might spend more money recruiting, training, and retaining air traffic controllers. Although human, they are a central and essential component of the ATC ICT system.

Finally, health care is often identified as an area in which ICT could productively play a larger role. Much of the discussion within the telecommunications policy community focuses on distance medicine, such as remote diagnoses and even remote surgery. It's inside-the-beltway popularity notwithstanding, improvements in distance health care would affect a relatively small number of Americans and would be yet another public policy that promoted a carbon-intensive, rural lifestyle.

Automated medical records have a much greater potential to improve the health care of most Americans while, in the long run, reducing healthcare costs. A central issue is whether there is anything the government can usefully do to promote greater adoption of automated medical records. In part because it operates an integrated delivery system serving a relatively closed population, the Veterans Health

Administration has been a leader in implementing medical information technologies. Would additional funding allow the Veterans Health Administration to create a model with broader applicability that Medicare might then adopt in order to create private-sector adoption incentives? Or, is there a way to use tax breaks or direct grants to create adoption incentives? There is an externalities argument for subsidizing adoption of automated medical records that conform to industry standards and, thus, are portable across care providers.

In summary, forget about using ICT for short-term macroeconomic stimulation. There are other, more appropriate tools. Promoting ICT investment, particularly R&D investment, may be a useful way to stimulate long-run economic growth, but there is a need for more information before concluding that programs targeted at this sector would be preferable to broader programs or even programs targeted at other sectors. Using the ten billion dollars to address important social issues looks more promising. The focus should be on areas in which there are significant externalities or other sources of divergence between private and social incentives to act.

Leveraging Communications: ICT as Economic Stimulus

Aspen, Colorado
August 20-23, 2008

Conference Participants

Bill Bailey

Vice President, Government
Relations
The Walt Disney Company

Ronald J. Binz

Chairman
Colorado Public Utilities
Commission

Dean R. Brenner

Vice President
Government Affairs
Qualcomm, Inc.

Kathryn C. Brown

Senior Vice President
Public Policy Development and
Corporate Responsibility
Verizon Communications

Jeff Brueggeman

Vice President Public Policy
AT&T

Michael Copps

Commissioner
Federal Communications
Commission

Alan Davidson

Director of U.S. Public Policy
and Government Affairs
Google

Charles M. Firestone

Executive Director
Communications and Society
Program
The Aspen Institute

Michael Gallagher

President and Chief Executive
Officer
Entertainment Software
Association

James L. Gattuso

Senior Research Fellow in
Regulatory Policy
Roe Institute for
Economic Policy Studies
The Heritage Foundation

Richard R. Green

President and
Chief Executive Officer
CableLabs

Note: Titles and affiliations are as of the date of the conference.

Dale N. Hatfield

Independent Consultant
and
Adjunct Professor,
Interdisciplinary
Telecommunications Program
University of Colorado at
Boulder

Thomas Hazlett

Professor of Law and Economics
George Mason University
School of Law

Kevin Kahn

Intel Senior Fellow and Director
Communications Technology Lab
Intel Corporation

Michael Katz

Harvey Golub Professor of
Business Leadership
Stern School of Business
New York University
and
Sarin Chair in Strategy and
Leadership
Haas School of Business
University of California–Berkeley

Chris Larsen

Senior Telecommunications
Services Analyst
Credit Suisse

Blair Levin

Managing Director
and
Telecom and Media Analyst
Stifel Nicolaus

Eli Noam

Director
Columbia Institute for
Tele-Information
and
Professor of Economics
and Finance
Columbia Business School
Columbia University

Robert Pepper

Senior Managing Director
Global Advanced Technology
Policy
Cisco Systems

Peter Phillips

Partner
Strategy and Market
Developments
Ofcom

Graham Richard

President
Graham Richard Associates,
LLC
and
Former Mayor of Fort Wayne,
Indiana

Alec Ross

Executive Vice President
External Affairs
One Economy Corporation

Deborah Taylor Tate

Commissioner
Federal Communications
Commission

Note: Titles and affiliations are as of the date of the conference.

Steven Teplitz

Senior Vice President,
Government Relations
Time Warner Cable

Jenny Toomey

Program Officer
Media and Cultural Policy
Ford Foundation

Lauren M. Van Wazer

Chief Policy and Technology
Counsel
Cox Enterprises, Inc.

Scott Wallsten

Vice President for Research
and
Senior Fellow
Technology Policy Institute

Joe Waz

Senior Vice President
External Affairs
and
Public Policy Counsel
Comcast Corporation

Simon Wilkie

Chair
Department of Economics
University of Southern California

Staff:

Sarah Snodgress

Project Manager
Communications and Society
Program
The Aspen Institute

About the Author

Professor Simon Wilkie is Executive Director of the USC Center for Communications Law and Policy as well as Chair and Professor of Economics at the University of Southern California. Previously, he held the positions of Assistant Professor of Economics at Caltech and was a Member of Technical Staff at Bell Communications Research. He received his Ph.D. (1990) and M.A. (1987) in Economics from the University of Rochester. He received a Bachelor of Commerce, Honors (1984), in Economics from the University of New South Wales.

His research focuses on game theory, its application to business strategy, economic and regulatory policy design, and the economics of the communications industries. It has been widely published in the leading scholarly journals including; *Economic Theory*, *The Journal of Economic Theory*, *Journal of Economics and Management Strategy*, *Games and Economic Behavior*, *Journal of Regulatory Economics*, *The Review of Economic Studies*, and *Social Choice and Welfare*. He currently serves on the editorial board of *The Journal of Public Economic Theory* and *The International Journal of Communications*.

He served as Chief Economist at the Federal Communications Commission from July 2002 to December 2003, reporting directly to Chairman Michael Powell. As Chief Economist, his responsibilities included advising the Chairman and the Commissioners, the oversight of the FCC staff economic analysis, and managing interdisciplinary teams of economists, lawyers and engineers. The major proceedings during his tenure include the Triennial Review of wireline competition policy, the Biennial Review of media ownership regulations, the regulatory framework for broadband, the creation of secondary markets for trading spectrum licenses, and the EchoStar/Hughes (DirecTV) merger transaction, the ATT Broadband/Comcast merger, and News Corp.'s acquisition of a controlling interest in Hughes (DirecTV).

Select Publications from the Aspen Institute Communications and Society Program

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

The Future of Video: New Approaches to Communications Regulation,
by Philip J. Weiser

As the converged worlds of telecommunications and information are changing the way most Americans receive and relate to video entertainment and information, the regulatory regimes governing their delivery have not changed in tune with the times. These changes raise several crucial questions: Is there a comprehensive way to consider the next generation of video delivery? What needs to change to bring about a regulatory regime appropriate to the new world of video? The report of the 21st Annual Conference on Communications Policy in Aspen, Colorado, outlines a series of important issues related to the emergence of a new video marketplace based on the promise of Internet technology and offers recommendations for guiding it into the years ahead. 2006, 70 pages, ISBN Paper: 0-89843-458-0, \$12.00

Clearing the Air: Convergence and the Safety Enterprise, by Philip J. Weiser

The report describes the communications problems facing the safety enterprise community and their potential solutions. The report offers

several steps toward a solution, focusing on integrating communications across the safety sector on an Internet-Protocol-based backbone network, which could include existing radio systems and thus make systems more dependable during emergencies and reduce costs by taking advantage of economies of scale. The conference participants stressed that the greatest barriers to these advances were not due to lagging technology but to cultural reluctance in adopting recent advances. Writes Weiser, “the public safety community should migrate away from its traditional reliance on specialized equipment and embrace an integrated broadband infrastructure that will leverage technological innovations routinely being used in commercial sectors and the military.” 2006, 55 pages, ISBN Paper: 0-89843-4, \$12.00

Reforming Telecommunications Regulation,

by Robert M. Entman

The report of the 19th Annual Aspen Institute Conference on Telecommunications Policy describes how the telecommunications regulatory regime in the United States will need to change as a result of technological advances and competition among broadband digital subscriber line (DSL), cable modems, and other players such as wireless broadband providers. The report proposes major revisions of the Communications Act and FCC regulations and suggests an interim transitional scheme toward ultimate deregulation of basic telecommunications, revising the current method for universal service subsidies, and changing the way regulators look at rural communications. 2005, 47 pages, ISBN Paper: 0-89843-428-9, \$12.00

Challenging the Theology of Spectrum: Policy Reformation Ahead,

by Robert M. Entman

This report examines the theology of spectrum—that is, the assumptions and mythology surrounding its management and use. The report looks at how new technologies affecting spectrum, such as software-defined radio, can challenge the conventional wisdom about how spectrum should be managed. Such innovations allow for access to unused frequency space or time on frequencies that are otherwise licensed to an exclusive user. 2004, 43 pages, ISBN Paper: 0-89843-420-3, \$12.00

Spectrum and Network Policy for Next Generation Telecommunications,
by Robert M. Entman

The report of the 18th Annual Aspen Institute Conference on Telecommunications Policy offers policy alternatives in both spectrum and network policy to achieve new gains for the telecommunications field. The first essay suggests new management approaches to encourage more efficient uses of spectrum while preserving the commitment to reliability of service and public safety values. The second essay debates the competitive structure of the telecommunications industry and its implications for building next-generation networks (NGN) and identifies three areas to encourage optimal development of the NGN: operate the NGN on a price-deregulated basis and begin to address access regulation issues, secure the intellectual property rights of content suppliers, and adjust the system of subsidized pricing to bring about competitively neutral pricing. 2004, 92 pages, ISBN Paper: 0-89843-394-0, \$12.00

Balancing Policy Options in a Turbulent Telecommunications Market,
by Robert M. Entman

This report assesses the future of communications regulatory paradigms in light of desirable changes in spectrum policy, telecommunications market environments, and regulatory goals. It suggests four models of regulation, including government allocation, private spectrum rights, unlicensed commons, and a hybrid system of dynamic spectrum access. It also addresses how changes in spectrum and other telecommunications policies, as well as new business realities, might affect current regulatory regimes for the telecommunications industries. The report includes an essay on spectrum management, "The Current Status of Spectrum Management," by Dale Hatfield. 2003, 79 pages, ISBN Paper: 0-89843-370-3, \$12.00

Telecommunications Competition in a Consolidating Marketplace,
by Robert M. Entman

In the telecommunications world, what would a fully competitive environment look like? What communications initiatives should policymakers develop—considering the ultimate welfare of the consumer—to implement change in the regulatory climate? This report explores ways to reshape the current regulatory environment into a new competitive

space. It addresses competition not only within but across separate platforms of communications such as cable, wireline telephony, wireless, satellite, and broadcast. The report also includes an essay on an innovative approach to wireless regulation, "Opening the Walled Airwave," by Eli Noam. 2002, 64 pages, ISBN Paper: 0-89843-330-4, \$12.00

Transition to an IP Environment, by Robert M. Entman

This report examines a "layered approach" to regulation. By viewing telecommunications in four separate layers—content, application, network, and data link—policy discussions can address concerns in one layer without negatively affecting useful existing policy in other layers. Also presented are beliefs that the growth of broadband should prompt a new discussion about universal service reform. The report also includes "Thoughts on the Implications of Technological Change for Telecommunications Policy," by Michael L. Katz. 2001, 78 pages, ISBN Paper: 0-89843-309-6, \$12.00

Six Degrees of Competition: Correlating Regulation with the Telecommunications Marketplace, by Robert M. Entman

This report addresses basic conceptual questions about what the nature of regulation should be in a competitive, broadband future. It also examines how fundamental policy issues such as interconnection, mergers, spectrum allocation, jurisdiction, universal service, and consumer protection should be handled in the interim. The report also includes "Regulation: The Next 1000 Years," by Michael L. Katz. 2000, 65 pages, ISBN Paper: 0-89843-279-0, \$12.00

Residential Access to Bandwidth: Exploring New Paradigms, by Robert M. Entman

This report explores policy initiatives that would encourage widespread deployment of residential broadband services throughout the United States. It identifies the regulatory system as one of the chief obstacles to achieving ubiquitous broadband deployment and offers a new regulatory model to overcome these barriers. 1999, 35 pages, ISBN Paper: 0-89843-256-1, \$12.00

Competition, Innovation, and Investment in Telecommunications,
by Robert M. Entman

This report considers how public policy can foster investment, competition, and innovative services in local exchange telecommunications. The report also includes “An Essay on Competition, Innovation, and Investment in Telecommunications,” by Dale N. Hatfield and David E. Gardner. 1998, 52 pages, ISBN Paper: 0-89843-235-9, \$12.00

About the Communications and Society Program

www.aspeninstitute.org/c&s

The Communications and Society Program is an active venue for global leaders and experts from a variety of disciplines and backgrounds to exchange and gain new knowledge and insights on the societal impact of advances in digital technology and network communications. The Program also creates a multi-disciplinary space in the communications policy-making world where veteran and emerging decision-makers can explore new concepts, find personal growth and insight, and develop new networks for the betterment of the policy-making process and society.

The Program's projects fall into one or more of three categories: communications and media policy, digital technologies and democratic values, and network technology and social change. Ongoing activities of the Communications and Society Program include annual roundtables on journalism and society (e.g., journalism and national security), communications policy in a converged world (e.g., the future of video regulation), the impact of advances in information technology (e.g., "when push comes to pull"), advances in the mailing medium, and diversity and the media. The Program also convenes the Aspen Institute Forum on Communications and Society, in which chief executive-level leaders of business, government and the non-profit sector examine issues relating to the changing media and technology environment.

Most conferences utilize the signature Aspen Institute seminar format: approximately 25 leaders from a variety of disciplines and perspectives engaged in roundtable dialogue, moderated with the objective of driving the agenda to specific conclusions and recommendations.

Conference reports and other materials are distributed to key policy-makers and opinion leaders within the United States and around the world. They are also available to the public at large through the World Wide Web, www.aspeninstitute.org/c&s.

The Program's Executive Director is Charles M. Firestone, who has served in that capacity since 1989, and has also served as Executive Vice

President of the Aspen Institute for three years. He is a communications attorney and law professor, formerly 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.