

**The 2010 Digital Broadband Migration Conference:  
Examining the Internet's Ecosystem**  
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*Executive Summary*

The 10<sup>th</sup> Annual Digital Broadband Migration Conference held by the Silicon Flatirons Center on Jan. 31-Feb 1, 2010, at the University of Colorado in Boulder, Colorado, brought together thought leaders, industry executives, and key government officials involved in shaping policy in the telecommunications sector in order to examine whether the Internet should be viewed as an “ecosystem” of sorts. The Internet is a place where a wide variety of network providers, application developers, content creators and end users co-exist with one another in an often tense fashion; where sometimes it is peaceful with shared goals and mutual understanding but other times there is friction which can lead the various players to go to “war” with one another.

The conference attempted to articulate the nature of this “ecosystem” and bring forth some of its policy implications. The panels and discussion ranged widely from topics in regulation, to innovation policy, to intellectual property rights and enforcement, to amending the Telecommunications Act of 1996, to changes in business models for the content industry, all the way through the economic-theory underpinnings of merger challenges and enforcement at the Department of Justice.

While the panelists offered insights and suggestions for future policy, they also raised a host of fundamental questions. Is the Internet truly an “ecosystem”? What is the Internet—an end in and of itself, or merely the current tool bringing users a broadband-connected marketplace of products and ideas? Should it be viewed as a chaotic quick moving animal (see former FCC Chairman Michael Powell’s colorful description of the Internet as a “gyrating, undulating beast”) or should it be seen as a manageable “complex adaptive system” and what implications do these separate views have for public policy?

One question discussed at length in the conference, and of great importance in the digital age, is how to balance the intellectual property rights of content holders against new methods for content delivery and the necessity for new business models. Finally, in terms of governance, especially with the now rapid and ever increasing pace of technological development, are there new models of governance that are flexible enough, dynamic enough, and ultimately fast enough, to cope?

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On January 31-February 1, 2010, the Silicon Flatirons Center hosted the 10<sup>th</sup> Annual Digital Broadband Migration Conference (DBM). The conference brought together thought leaders, public interest advocates, government officials, industry executives and luminaries in the telecommunications and regulation world to examine the Internet as an “ecosystem.” (A full list of the participants is set forth in Attachment A). Likened to a “chaotic, undulating beast” by Michael Powell, former Chairman of the FCC, a metaphor subsequently picked up by other panelists, the Internet is a place where a wide variety of network providers, application developers, content creators and end users co-exist with one another in an often tense fashion. In the best of times, this is a peaceful co-existence with shared goals and a mutual understanding of the interdependent nature of the ecosystem. In the worst, the different actors are at war with one another—either in word or in deed.

At the previous year’s conference, the 2009 DBM (on Imagining the Internet’s Future), the interconnected nature of the Internet as an “ecosystem” was a dominant theme. In the 2010 conference, this characterization was picked up and examined in depth with respect to a number of issues, including: (1) the dynamics of market structure and opportunities for innovation; (2) governance challenges around issues involving cooperation, such as the issues around interconnection between network providers, as well as between network provider and application developers; and (3) the business models that sustain content in an environment where many content creators (newspapers, for example) are straining to find a source of revenue to stay in business. This year, the conference began with a brief welcome by Dale Hatfield, Executive Director of Silicon Flatirons and Adjunct Professor in the Interdisciplinary Telecommunications Program at the University of Colorado, and was then followed by a short memorial to a recently deceased long time conference participant and Silicon Flatirons supporter, Peter Rohrbach.

Starting off the conference proper, Phil Weiser, former Silicon Flatirons Executive Director and recently appointed to the Department of Justice, Antitrust Division as Deputy Assistant Attorney General for International, Policy and Appellate Matters, began the overview address with three overarching themes: (1) the role of entrepreneurship; (2) the dynamics of innovation; and (3) the role of competition policy.

Entrepreneurship, and the entrepreneurial spirit, is one of our nation’s great strengths. In the United States it is a cultural norm that people are not afraid to try (and sometimes fail), whereas in many other countries this can be seen as a badge of failure. Weiser highlighted the role of venture capital in entrepreneurship, and how, with today’s average employee having many different employers in their lifetime rather than the small handful of employers that was the historical norm, everyone can be seen as an entrepreneur now. In terms of the dynamics of innovation, the modern accepted wisdom, he said, is innovation drives economic growth and economic growth, in turn, comes from “better recipes not just more cooking.”

Competition policy is intimately related to entrepreneurship, as it lays down the “rules of the road” when it comes to competition and competition is often the driving force behind innovation. Here, Weiser noted the difference between two different components of competition policy, antitrust and regulation. Antitrust is *not* a form of regulation, he said, regulation is used as a substitute for competition only when antitrust does not work. Established firms may resist innovation; seeing it as a challenge and a threat. But antitrust, according to Weiser, protects competition and innovation through protecting “disruptive entry” by new firms entering the market. He then described how the Antitrust Division of the Department of Justice (DoJ) engages in competition “advocacy” and how the DoJ has a “powerful mission” to inform regulators when their respective policies may discourage competition. Wrapping up the overview, Weiser pointed

out how innovation is crucial to our country's economic future and the tools of entrepreneurship and competition policy are crucial ingredients.

### **Panel I: The Internet Ecosystem in Perspective**

The first panel, moderated by Phil Weiser, focused on giving participants and attendees a high level view of the major issues facing the Internet "ecosystem" and tried to put it all in perspective. Weiser started the panel off by asking the foundational question of which forces seemed to be driving the "ecosystem" forward and, equally as important, which forces look to be holding it back.

One of the key elements driving the ecosystem forward, according to many panelists, is cloud computing. Cloud computing, as defined by the panelists, is where software and services are hosted remotely at a data center instead of on the individual user's laptop. Lisa Tanzi, Vice President and Deputy General Counsel for the Business Division at Microsoft, saw this technology moving into the enterprise space and allowing companies to use it for their core infrastructure at great cost savings. Brad Feld, Managing Director at Foundry Group, a venture capital fund with a focus on early stage technology and software companies, felt larger companies seemed to *finally* be accepting technology that had been around for quite a while. He felt, from the venture capital perspective, there had been overfunding in the cloud computing sector for some time and cloud computing might be the current "buzzword." Regardless, he said, a tremendous amount of underlying innovation is occurring in this area, with an interesting role "reversal" in the innovation cycle. Historically, he said, the needs of the consumer tended to lag innovation, which was often driven by the needs of the enterprise customer, whereas with the rise of broadband connectivity innovation seemed to be taking cues from the consumer. Taking a broader perspective, Dale Hatfield said he has seen the cycle of centralization and decentralization before, but was slightly "suspicious" of *re*-centralization—especially if it impinged on the individual user's "freedom" to run their own applications.

Security and privacy were serious concerns for all panelists in terms of forces that could be holding back the Internet "ecosystem." Initially, they pointed to the recent conflict over cyber-security between Google and the Chinese government and felt this could very well be just the beginning; sometime in the very near future there will be a massive breach of data security and it is time to get "serious." One panelist asked whether the "cloud" could yet be properly trusted with each of our families' personal information. In terms of security, Lisa Tanzi said, there has been much debate on whether the "cloud" is more or less secure than how user information has previously been stored. As more information moves to the "cloud" and its data centers, according to Tanzi, these data centers will become more attractive as targets for hackers regardless of the relative security. She felt there is a role for government in this area, and there is a need for "truth in cloud computing" principles in order for consumers to be more fully informed as to how their information is handled and used. Additionally, she felt there should be stronger civil and criminal penalties for hacking. Finally, due to the nature of global data flows and the international placement of data centers, she said there may be some conflicts and difficulties with the various countries' laws, especially where those laws are more or less protective of a user's data than relevant U.S. law.

The need for more security and privacy on the Internet was a matter of course for the panelists, but it was the balance between the two that garnered the most attention. Starting with privacy, Lisa Tanzi pointed out how it is not clear whether Fourth Amendment privacy protections even applied in the cloud-computing context. Since the user is *volunteering* their personal information, courts might not find the same expectations of privacy and thus refuse to protect it. She pointed out how the case law in this area is very fact specific and this may mean the law in this area is not settled. In light of the new technology, said Tanzi, Congress needs to

amend the statute to properly balance users' privacy needs against the needs of law enforcement. Paul Ohm, Associate Professor of Law at the University of Colorado and a member of the audience for this panel, was equally concerned with this balance and felt there is always a cost to privacy and security. In this vein, he asked the panel, what should users expect to give up in order to have both? According to Brad Feld, it was not possible to have both privacy *and* security, but this was a technology driven issue not a regulatory one. He then posed the question of whether users ever really had the privacy they thought they did and pointed out how password security tends to be laughable—referring to the average consumer's tendency to choose an insecure password, as well as often using the same password for multiple accounts.

When it comes to security and passwords, Michael Powell, Senior Advisor of Providence Equity and former Chairman of the Federal Communications Commission, said there are much more sophisticated ways to provide security. As it stands, he said, the average consumer has significant amounts of "responsibility" for their online security but does not have the right tools nor a healthy approach. There is not a "culture" of security among the average users, he said, and no consensus on how to approach passwords or what "healthy" password behavior is. He felt there was no "digital hygiene." Specifically, children are developing digital behaviors when they are young and have very little at risk, but how will these fairly lax behaviors play out when today's children grow up and have cars, houses, and sizable bank accounts? Finally, he pointed out how the military version of security was not invulnerability, for security is not something that can ever be guaranteed, but is more of an ongoing chess game where each move is analyzed and then countered. Real security, according to Powell, is about raising the costs of a violation to such an intolerable level that any intruder would simply choose to go elsewhere.

The pace of technological development was a major concern. Most panelists agreed the pace of technological development is accelerating and this trend could actually have negative implications for the "ecosystem." The "ecosystem" is a very complex place, a vast complicated interconnected networks and networks of networks where often there are machines that are only talking to other machines. With the rapid pace of technological development, said Brad Feld, increasingly there is the chance computers could become autonomous in our lifetimes and there is a surprisingly large amount of this computer-to-computer interaction on the Internet. Powell built on these comments by pointing out how humans are already creating systems with levels of complexity beyond our ability to understand and it will be difficult, if not impossible, to maintain a "holistic" understanding of these systems as the complexity continues to increase. He cited the recent financial crisis as an example; that we as a species are creating "brilliant" systems of immense complexity, but failing to understand them.

Continuing along this same thread, and foreshadowing significant themes discussed later in the conference, panelists pointed out how technology is now moving much faster than the regulatory environment can keep up with. One panelist asked if the government might be the wrong tool in this context—if the technology industry is moving faster than governments can react then it might be more effective to have industry coalitions self-regulate. Michael Powell continued in this same line, highlighting the current lack of effective governance tools to address this dynamic because the system as it stands is not "structurally" able to move fast enough. What might a good organizational or bureaucratic model in the Internet age might look like, he asked. Adding in the technical perspective, Dale Hatfield wondered if it would be better to give engineers a larger role in resolving some of the disputes and pointed to a recent proposal allowing the FCC Commissioners to add back a technical assistant onto their staff.

The panelists were also concerned with the effects of education and immigration policy on innovation. The United States has been less intelligent than it could be in its immigration policy, according to the panelists, and the general consensus was the U.S. should be "keeping" as many of the foreign students who gain education here as it can. Half jokingly, Brad Feld floated

the idea that “every technical undergraduate degree should come with a green card.” He also felt it was very hard to get a visa in order to start a company in the U.S. Finally, the general state of education in the U.S. was cause for concern. Our nation’s technological ambitions, according to Michael Powell, do not line up with the educational track its citizens are generally on. Alluding to the alarming statistics concerning high school drop out rates in the U.S., he said education is our “Achilles’ Heel” and felt there were implications for both our labor force and our “consumption” force. As a counterpoint, industry panelists mentioned it had been relatively easy to hire top talent recently, but attributed this to the short-term effects of the current recession.

Near the end of the panel, a question from the audience concerning intellectual property, specifically how to balance fair use with the need to police piracy and copyright infringement, sparked significant debate. As the argument goes, and this theme arose throughout the conference, if content is not protected then content creators will not put it on the Internet. Brad Feld pushed back, saying there was not such a clear cause and effect relationship between the two—content will still be put on the Internet without copyright protection. He gave the newspaper industry as an example and pointed out how the smaller players, who are putting their content online and giving it away for free, are forcing the big newspapers to put their content online as well in order to stay relevant. Michael Powell added a public policy dimension to the discussion by highlighting how there are many things consumers want in terms of content, they do not want to pay for, but still cost money to provide. Dale Hatfield felt the “elephant in the room” is how the marginal cost of producing an extra copy in the digital world is effectively zero, but our economy is still based around goods produced with some marginal cost (what has until recently been the historical norm). The pricing and business models have yet to fully make the change from an industrial to an information economy, according to Hatfield, and when the marginal cost of producing something is zero there are incentives for consumers to “cheat.” These issues are not new though and other industries have been facing them for some time, for example, the software industry has been at zero marginal costs almost since its inception. According to Feld, media companies could learn a lot from how the software industry has approached these pricing and business model issues. Feld also pointed out how a number of corporations own “properties” in more than one category—i.e. content companies own applications providers and/or own network providers and vice versa—and he felt this cross-category ownership dynamic will provide solutions and drive future innovations.

Other topics mentioned but not fully discussed during this panel were: managing spectrum resources, maintaining a balance in the level of competition, investment as a key component of competition and innovation (especially investment in basic research and development), how companies are “webifying” their business in order to stay competitive, “applications aware” networks—where the applications themselves determine their own bandwidth needs, increasing “digital literacy” among consumers when it comes to broadband adoption, and to what extent the broadband migration has yet to affect how many day-to-day business processes actually work.

## **Panel II: Evolving Business Models and Policy Challenges for the Content Industries**

The second panel focused on the challenges facing a key element of the Internet “Ecosystem,” namely the content industries. The panel asked how business models are changing to cope with the realities of the Internet environment and what attendant policy challenges there are. The panel was moderated by Jonathan Sallet, Senior Adjunct Fellow for Silicon Flatirons and a Managing Director at the Glover Park Group, and followed a slightly different format than the overview panel with presentations of scholarly work followed by discussion.

At first glance it seems somewhat dire in the content industries, with various players either closing their doors or merging in order to stay afloat. Alternately though, almost every major publication now has some sort of web presence and many are experimenting with ways to monetize online news distribution. Though somewhat chaotic at the moment, Sallet felt that in the future, the current era might be seen as a time of extreme creativity in business models.

### *Structured Viral Communications*

Mark Cooper was the first panelist and his paper focused in on what he termed “structured viral communications.” He felt that there was a “sweet spot” between group forming social networks and the “one-to-many” model of broadcast-type networks, and in this sweet spot the center of the network can facilitate communications occurring at the fringe. This, he said, was a structured viral network and it has massive potential, especially because technology has reduced the costs of communication and distribution to essentially zero. Cooper felt there had been significant increases in readership of newspapers and other media over the past decade, and it was in no small part due to how blog posts tend to link to a newspaper article. He did point out there were some organizational and profit challenges in structured viral communications though.

In terms of organization, Cooper highlighted how it can be difficult to get all of the consumers to talk to each other about specific things. He gave the Obama presidential campaign as a positive example of a structured viral communication that was able to keep the volunteers on message, but in most cases, due to the high level of autonomy at the individual level, it can be difficult to ensure regularity in the collective effort. Rhetorically he asked, if each volunteer can do what they want, how do you keep them doing what *you* want? Next, Cooper addressed the profit difficulties. He pointed out in many content industries, newspapers are just one example, the bulk of the cost is in the distribution and manufacture of the media and not in the creation of the content itself. This has large implications, he said, when it comes to margins and the digital revolution because historically media has tended to be a high margin business whereas now it is being pushed towards a price point generally at its costs. Cooper felt this trend started with file sharing, what he termed the “civil-disobedience” first creating viral communication, but now content holders were being driven to live in a zero margin world. According to Cooper, content holders and creators can be at neither a zero margin nor an oligopoly-pricing world, they have to cover their costs in order to have a product. As a final note, he said it can be difficult to profit from structured viral communications because the profit opportunities are “around” the communications and not inherent in the transaction itself (unlike where the profit has been historically).

### *Reforming Public Broadcasting*

Ellen Goodman, Professor of Law at Rutgers University, felt there was a continuing role for public media in the new information ecosystem. Previously, according to Goodman, the sports and classified sections of a newspaper subsidized the other sections of the paper and helped to fund the investigative journalism. Now though, services like Craigslist, eBay, and other online marketplaces are replacing the newspapers’ classifieds revenue stream. In order for public media to stay relevant, she said, it must change its structure.

Like anything else, there are both good and bad elements of public media. On the one hand, according to Goodman, it can be criticized as being “out of touch,” as only serving a small minority, or irrelevant in the modern age of proliferating new media. On the other hand though, it can also correct market failures by providing the type of news the market under-provides, can have more credibility and authority than many sources of new media, and can have an “institutional community” function. She then framed the question of how public broadcasting

might fit into the new “broadband landscape” through a historical look at the rise of public media, specifically the Public Broadcasting Act of 1967.

The Public Broadcasting Act, according to Goodman, was originally thought of as solving a market failure and as an alternative service. There was a notion of active outreach and engagement by the broadcasters with the public, not just a passive broadcast of media. Possibly, she said, it was time to redefine the functions of modern public media; focusing in on: (1) Content Creation; (2) Curation—providing access to, a platform for, and an archive of public media content; and (3) Connection—engaging the public with content. Unfortunately, the 1967 Act restricted federal support to broadcast stations and thus, Goodman argued, it was time to change the 1967 Act by allowing a wider range of entities and individuals access to funding.

### *Competing with Free—Is the Sky Really Falling?*

Are the content industries really “doomed” if they are forced to compete with “free”? The content industries generally seem to be telling lawmakers that they cannot compete with freely provided content but, according to Mark Lemley, the William H. Neukom Professor of Law at Stanford University, this is not the first time they argued that a new technology would put them out of business. He then gave some examples, stretching all the way back to the advent of the printing press and how it threatened monk scribes, to the introduction of photography and the fears of sketch artists, to free over-the-air music radio, and then up to VCRs “threatening” television. The argument tends, he said, to hinge on business model protection; without a way to get paid, content creators will not produce content, or so they say. Over time though, the content producing industries have never gone away and thus it is a classic “Chicken Little” problem—the content industries have claimed the “sky is falling” whenever a new technology has been introduced—but each technological change has merely changed the business model, and while some revenue streams have gone away, new ones always crop up. Where is the new model then?

Lemley framed the search for a new business model by examining some trends. The digital revolution, he said, has revolutionized content creation and now there is more content than ever before, but there is also a wide variation in quality. Consumers want to be engaged with their content—they want experiential relationships with content—for example in the form of concerts and live shows. Where content creators have lost first-mover advantages, because of how easy it is to copy digital media, brand and convenience may bring some of those advantages back. Finally, he said, there are some emerging trends in terms of the demographics. The consumers who are getting content for free tend to be of a low socioeconomic status, whereas the consumers with means tend to pay. The role of media is changing, it may have changed to quality control and credentialing—in effect telling the consumer what content is to be trusted or is of a certain quality—or it may now be focused on its experiential value, but it is obviously changing. In short, according to Lemley, there may not be certainty as to what the new business model will look like, but there most definitely will be a new model.

### *Discussion*

Michael Gallagher, President and CEO of the Entertainment Software Association, began the discussion segment of the panel with a focus on the video game industry and how it has approached new business models. He started by contrasting the PC gaming market with the home console market (e.g. Xbox, Wii, Playstation, etc). The PC gaming market, he said, is small and getting smaller, whereas the console gaming market is growing rapidly. This is surprising when the computer has a much wider user base, is connected to the Internet, and is generally fairly easy to use and understand, but Gallagher pointed to software piracy as the deciding factor, and said

developers are hesitant to make PC games because piracy is rampant. In contrast, the console interface has enhanced digital rights management that limits the use of pirated console games.

In terms of evolving business models, Gallagher said the video game industry has continued to move forward and utilize technology despite the looming threat of digital piracy. One new business model is making legal content more attractive than pirated content through “enhancing” the paid experience. This is done by giving the consumer significantly more value if they pay for the product than if they do not. For example with interactive online gaming that can only be accessed through a paid legitimate copy of the video game, along with various additional services such as free updates, additional levels, or gaming magazine content. The video game industry, according to Gallagher, is trying to stay focused on the consumer and keep its hardcore following while at the same time protecting the intellectual property. He mentioned other potential business models such as: (1) subscription models; (2) “pay to play”—up charges for small enhancements to the game; (3) and handheld gaming devices—where *all* the content is downloaded so there are no physical copies of the game to pirate.

Preston Padden, Executive Vice President of Governmental Relations for Walt Disney, echoed the concern that piracy is a major obstacle to new business models in the content industry. He felt not enough was being done to police the Internet service provider networks to stop infringers. In terms of moving more content to the “cloud,” Padden pointed to recent “key chest” technology where Disney was trying to get all content creators to buy into a technology that records all the rights each individual consumer has to content, meaning the content then could be used on any device. Other participants felt it was good to have a central depository of rights, but it was key to keep an eye on the expense of the program, because high fees could be very difficult for smaller companies.

Gigi Sohn, Senior Adjunct Fellow at Silicon Flatirons and Founder of Public Knowledge, felt there had been a lot of commentary during the conference about intellectual property law enforcement, but no one had asked the hard questions. Initially, she asked, *who* should enforce the copyright laws? She said it was the purview of Congress and emphatically not the job of the FCC. Additionally, Sohn felt there should be a balance—that Draconian copyright protections would deter adoption and accessibility of new business models—and the protection of intellectual property should not be used to deter legitimate discourse. Next, she asked how IP should be *protected* and *enforced*.

Sohn critiqued two proposed methods for protection and enforcement of content holders’ intellectual property rights: (1) “Three Strikes” and (2) copyright filtering. In a “three strikes” regime, she explained, a user would be thrown off his or her Internet service provider (ISP) based on three separate *allegations* of copyright infringement by copyright holders. In this context, regarding the Digital Millennium Copyright Act (DMCA), Sohn said there are a high number of “false positives” and, importantly, the relevant section of the DMCA actually refers to violations and not *allegations* of violations. Additionally, in many countries there is a growing trend finding access to the Internet as a fundamental right, and any deprivation of a fundamental right here in the U.S. would clearly implicate due process considerations. In contrast, copyright filtering is basically “deep packet inspection,” where an ISP “looks” into the data to see if there is a copyright violation. There are serious privacy concerns with this process and she likened it to opening “every piece of mail” that came through the postal office. Sohn pointed out the difficulties in automating any sort of copyright infringement policing process as well. In order to find a copyright violation a judge must engage in a fact intensive inquiry and a nuanced balancing process, and that no automated filter can be a “judge in a box”; telling the difference between data that is a copyright violation and data that is merely a lawful communication like an email.

### **Panel III: Industry Structure and Opportunities for Innovation**

Panel three addressed the structure of the industries involved in the Internet and delved deep into competition policy, specifically the underlying economics and theory in regards to regulation of the Internet “ecosystem.”

One highly regulated and competition policy laden area is when one company merges with another. Mergers can be very important to the health of a given industry and often they are one way to generally increase the efficiency within the sector and make it more competitive, through the elimination of duplicitous costs when two former competitors become one, or as the carrot luring a potential competitor to enter the industry when they are evaluating potential exit strategies. On the other hand, mergers can be a way for dominant firms to eliminate competition and increase prices for consumers. Balancing the potential gains of a merger against the potential losses to competition and consumers is a large theme in competition and innovation policy. Carl Shapiro, Deputy Assistant Attorney General for Economics in the Antitrust Division at the Department of Justice, began his presentation by discussing the effects of a merger on innovation in a given industry and how this dynamic has recently come into the analysis for many of the merger challenges at the Department of Justice (DoJ). One underlying note of caution though, he pointed out, is how the specific effects of a merger can be difficult to predict when markets are changing quickly.

Laying the groundwork, Shapiro pointed to three different notions of competition: (1) Product Market Competition—which is the traditional rivalry between competitors on price and quality of competing products and is usually in the short run; (2) Next-Generation Contestability—this is the extent to which product sales will shift to the firms offering the best next-generation products and is in the medium run; and (3) Innovation Rivalry—where there is simply a diversity of approaches and it can be very hard to bring a merger challenge based solely on this. Looking at the product market competition view, he said the “structural presumption” has weakened and the prevailing thought is larger companies, even in highly concentrated markets, may be able to innovate more successfully than a number of smaller competitors. The larger companies can have significant budgets and resources allocated to innovation, as well as incentives to innovate in the form of potentially higher profits on their larger sales. Focusing in on the next-generation contestability notion of competition, Shapiro said some markets have high levels of “inertia”—the switching costs from one product to a competitor’s product are too high for the consumer—and these markets are not as contestable. It is in the high contestability markets—where there are lower costs of switching—that there can be a larger reduction in competition from a merger. In short, it is in these highly contestable markets that a merger is more strictly scrutinized.

Taking a broader view of the Internet “ecosystem,” Howard Shelanski talked at length on how different parts of the Internet, in this case last-mile networks versus applications, could have very different issues and different policy implications. In discussing the applications market, Shapiro felt it is often seen as a single entity, but in reality it is a “basket” of different markets—a layered and varied set of markets—for antitrust purposes. Turning to the last-mile network market, he pointed out that though it is a very concentrated market, billions of dollars were being invested and this high level of investment indicates there is no need to regulate based solely on a fear of monopoly. He also highlighted how modern markets may end up smaller and more concentrated than it was once thought healthy and still be sufficiently innovative because—based on modern economic research—tiny oligopolies are not necessarily terrible for innovation. Finally, Shelanski pointed out to the jurisdictional issues in deciding which agency should be protecting consumers from unfair competition practices in the “ecosystem.” Specifically, he felt the FCC may not have the ability to police the applications providers under its “ancillary”

jurisdiction, and it might fall under the DoJ's purview, but Congress should act in order to clarify this.

The panelists felt competition policy must support innovation. Daniel Weitzner, Associate Administrator for the Office of Policy Analysis and Development in the Commerce Department's National Telecommunications and Information Administration (NTIA), said any new innovation policy concerning the Internet "ecosystem" must lead to continued innovation, but questioned what the specific goals should be. Is preserving the Internet itself a proper policy goal, or is it better to simply preserve a broadband-connected marketplace; in essence, is the Internet merely a specific technology or a bigger phenomenon? Weitzner wondered if mandating an "open" Internet was locking the fundamental desired result into a specific technology or if it was doing something else.

Probing further into the underlying nature and function of the Internet, Weitzner alluded to the "undulating chaotic beast" metaphor from earlier in the conference, but said, in contrast, the Internet was remarkably stable when it came to the standards and business models used. Using the fundamental stability as a starting point, he then asked where the status quo was valuable and what core characteristics should be preserved as policy makers move forward. He pointed to the stability and simplicity of the basic network standards used and how these were the key to the innovations at the application layer. He also pointed out these simple and stable standards were also free to use, which is what made the Internet so usable and popular with innovators and entrepreneurs in the first place. In order to move forward, according to Weitzner, it will be key to: (1) find clarity around the public policy goals; (2) find better analytic tools to gather data on it; and (3) find better regulatory tools.

### *Discussion*

Hon. Stephen Williams, Senior Judge for the U.S. Court of Appeals, D.C. Circuit, began the discussion portion of the panel by critiquing some of the difficulties with an intensive fact-based analysis of a merger; where he characterized the underlying principle as fact-based analysis first and action later. He felt there were high costs in terms of the: (1) Expense—the lawyers and economists gathering data have a cost; (2) Delay of the merger; (3) Disincentives in contemplating a merger (even a good merger); and (4) Reduced entry—because a reduction in mergers makes exit more difficult, meaning fewer firms will enter that market because a major exit strategy is to sell to another, and often larger, company in that same market. Williams felt false positives were an issue in the merger analysis, in they prevent mergers that otherwise should take place. He felt the factors involved in any inquiry should be easily ascertained and bright line rules would be helpful.

Jon Nuechterlein, partner at the law firm of WilmerHale in Washington, D.C., echoed the concerns with regulatory jurisdiction over the Internet. He said the current regime does not address how to regulate the Internet "ecosystem" under a single agency's jurisdiction and thus there are entirely different models regulating different sections, resulting in regulatory anomalies. The FCC, according to Nuechterlein, has come close to being the sole regulator but the courts are questioning its jurisdiction. Finally, he said the FCC may reclassify broadband traffic as telecommunications—due to its growing voice traffic and which would make all network providers common carriers—but this may stifle innovation on the Internet due to the regulatory uncertainty.

Kathryn Brown, Senior Vice President for Public Policy Development and Corporate Responsibility at Verizon, critiqued the current state of telecommunications public policy by pointing out the need to revise the 1996 Telecommunications Act. She said the 1996 Act did not envision much of the new technology and had not even contemplated the "Internet," thus leaving

enforcement of the Act in a “muddle.” Brown felt the government policy should be changed, with an eye towards being: (1) transparent; (2) open; (3) user-driven; and (4) technical—giving engineers the “first crack” at technical issues.

#### **Panel IV: The Governance Challenges of Cooperation in the Internet Ecosystem**

The fourth panel focused on how to govern the Internet “ecosystem.” The moderator, Paul Ohm, Associate Professor of Law at the University of Colorado, began the discussion by acknowledging the “ecosystem” as a useful metaphor when discussing the Internet and the attendant innovation and technology involved, but steered the discussion squarely into exploring what new models of governance were appropriate in this new technologically swift and interconnected world. Initially, from a definitional point of view, Ohm pointed out “governance” does not necessarily mean “government.” There are a variety of categories of governance, including: (1) self-regulation; (2) no regulation, (3) “command and control”; and (3) the “furrowed brow”—the *threat* of regulation. There are also a number of different players in these different governance regimes, such as legislative bodies and industry standards-setting organizations. The panel then commenced with presentations of scholarly work followed by a general discussion.

#### *ICANN*

Michael Fromkin, Professor of Law at the University of Miami, began by focusing on the Internet Domain Name System (DNS) and its governance organization, the Internet Corporation for Assigned Names and Numbers (ICANN). The DNS translates the “names” of a URL ([www.silicon-flatirons.org](http://www.silicon-flatirons.org) for example) into an Internet Protocol (IP) address and is a mapping of sorts. The IP address basically tells computers or other devices how and where to find each other on a network, most often on the Internet. This mapping needs uniqueness and a master list or repository of all IP addresses in order to function properly.

The presentation began with a brief history of ICANN and an overview of some the organization’s weak points. Referring to its “decade of tensions,” Fromkin pointed to concerns over ICANN’s public participation, openness, pricing, the process of assigning IP addresses (especially when it came to trademarks and competition), and international concerns with U.S. control over ICANN. In response, he said, the United States has been stepping back from its primary role and is steadily becoming a mere participant in the emerging, largely international, governing board of ICANN. Structurally though, Fromkin felt little would change, because ICANN is still not for profit, is still based in the U.S., and has merely reaffirmed years-old unenforceable promises to engage in “good” processes.

Fromkin concluded by highlighting the potential threat models facing the United States as ICANN evolves. First, as ICANN evolves into a more international body, it may start conforming to local law in the countries in which the Internet and IP addressing operates and the local law may conflict U.S. law. Second, ICANN could be “capture” by fanatics—what Fromkin colorfully called ICANN “gone wild”—but, as he pointed out, it is not clear what the potential harm would be in this situation since an alternate addressing system is not technically difficult. Finally, there is the possibility the DNS system could become irrelevant, but since a large percentage of Internet searches still begin with a search engine (versus simply typing the URL into the address bar of the browser), combined with the upcoming movement to IPv6 to provide even more IP addresses than IPv4, it is unlikely that the DNS will be going away anytime soon.

### *Data as Infrastructure*

Data is all around us, and in this day and age it is becoming more and more important, as well as more and more ubiquitous. As we engage in more online transactions, and often each device or appliance we use to complete the transaction is given its own unique IP address, the role of data is changing. Frank Pasquale, Professor of Law at Seton Hall Law School and Associate Director of the Gibbons Institute for Law, Science, and Technology, presented his thoughts on data as infrastructure. Pasquale alluded to earlier discussions surrounding net neutrality and whether Internet service providers should be regulated as common carriers, but felt there was a need to gather more data in order to evaluate if more regulation was necessary. The major concern, from his point of view, was the “black box” business models where industry players refused to share with the world how or what they were doing; one major fear is if all the network providers were “black boxes.”

Most businesses, according to Pasquale, are both data providers and data destroyers. Many companies do not want to keep their data and engage in systematic destruction of data, whether as required by law—e.g. the Patriot Act, or various document discovery rules—or in an effort to anonymize data, or to obscure data to protect their intellectual property or business processes, or in company wide litigation prevention policies. Pasquale felt there were problems with leaving data governance solely up to these “intermediaries.” First and foremost, he was concerned about the loss of data to researchers who want to study it. Second, he asked if citizens should be allowed some sort of access to all the data associated with them as individuals—something akin to the Credit Reporting Act or a sort of “fair use” approach to data. Third, he asked if there was some threshold level of data that should be free and available to all in order to ensure healthy competition among companies. Finally, Pasquale felt some types of data should be standardized and/or portable. Pointing to the financial crisis, he said there was some difficulty in determining how deep the crisis actually went because the data was not standardized and was difficult to understand. In terms of portability, Pasquale felt many types of data need to be able to “move” easily, for example an individual’s healthcare information. The bottom line is, he said, key industries need to standardize their data and make this data more accessible—healthcare and finance to name just a few.

### *The Internet—A Complex Adaptive System*

Pierre de Vries, Senior Adjunct Fellow at Silicon Flatirons and consultant on the intersection of information technology and government policy, squarely addressed new models of governance and felt a promising approach was to look at the Internet “Ecosystem” as a complex adaptive system. Initially, he pointed to six major changes occurring, with the first three being generally technological and cyclical, while the last three were qualitatively different: (1) Modularity; (2) Convergence; (3) Decentralization; (4) the Third Sector—non-governmental bodies pursuing governmental objectives (ex: standards-setting bodies in the telecom sector); (5) the Social Acceleration of Time—technology and how it affects daily life is changing much more rapidly and our institutions are having difficulty coping; and (6) Scale—everything is happening on a much wider and larger scale than ever before. A complex adaptive system, according to de Vries, is a collection of interacting adaptive agents with emergent properties (the human body for example, with its emergent property of consciousness). There are four key properties to a complex adaptive system, he said, which are: cycles and phase changes, incomplete knowledge, a cross-linked hierarchy, and novelty or surprise. Both an ecosystem and the Internet are complex adaptive systems, according to de Vries, but comparing the two is like saying an “elephant is a whale.” They are vastly different creatures in terms of shape and function, he said, but underneath they are both large mammals. He then pointed out that maybe a “managed” ecosystem was a better metaphor in that it is largely autonomous but regulators are being held accountable.

De Vries pointed out the Internet “ecosystem” was being asked for both innovation and stability, which are often mutually exclusive. He felt resilience could resolve this and highlighted four principles he thought applicable. First, was flexibility—de Vries felt regulation should focus on outcomes and allow for flexible processes in search of those outcomes. He pointed to how the common law process as a model in how it looks at the facts, tries to bring out the underlying principles and then figure out if the principles should change in light of the facts at hand. Second, came delegation—he felt the regulatory authority should be delegated to the “local” experts (for example, in the telecom sector, authority should be delegated to the self-regulatory bodies). Related to this, he said, was co-regulation where the government stood as a backstop to the self-regulatory bodies in a more explicit manner. Third, de Vries said a big picture view is necessary in that it is not possible to optimize the whole complex adaptive system simply by optimizing its individual parts. Finally, there must be diversity and this diversity will make a system more resilient. This diversity can come out in two different ways when it comes to regulation. Regulators must allow for multiple solutions to the same problem and ensure competition so as to prevent too much concentration in a given industry. In conclusion, said de Vries, there needs to be a shift to adaptive complex systems thinking because the Internet is much more complex than what telecommunications used to be.

### *Discussion*

Brent Olson, Assistant Vice President for Public Policy at AT&T, pointed out there was a common theme in the presentations of governance, but underlying this theme was the complexity of the Internet “Ecosystem.” One key question, he said, is within this complexity, jurisdictionally speaking, who should govern what and should this be shoehorned into existing regulatory agencies? The primary focus of this regulatory inquiry though, he said, should be “what and how” the Internet ecosystem is regulated not “who” regulates it. While we do not know all of the answers, he said, we also do not know all the questions.

Marc Berejka, Policy Advisor in the Secretary’s Office of the U.S. Department of Commerce, said many of the same debates concerning governance and the Internet were going on five and ten years ago. He felt it would be “irresponsible” not to provide some governance or guidance to the Internet, but the challenge was to figure out the proper governance tools. He contrasted the two views of the Internet put forth during the conference, on the one hand being seen as a chaotic “undulating beast” and on the other as a complex adaptive system, concluding that a system view had policy implications, whereas the “chaotic beast” view does not move the governance discussion forward. Here, according to Berejka, translating the literature on complexity theory into policy tools is the key. In terms of helping order to emerge from a complex adaptive system, he described how law making has evolved as the pace of societal and technological change has increased. As time has passed and the pace increased, thought Berejka, society began with common law, then moved to statutory law, then to regulation, but what should come next? He pointed to the potential for some modified version of common law, but said, regardless of the form the system took, it would need to be more flexible, adaptable, and agile than the current regulatory system in order to avoid heavy handed solutions.

Edward Felten, Professor of Computer Science and Public Affairs at Princeton University, addressed both ICANN and data as infrastructure. Because ICANN simply has control over the “root,” he said, it does not really have power. The technical details mean anyone can have the power of the root and there does not need to be a single root. For example, currently the top-level domain name is “.com” but it could be any name so desired. Felten likened ICANN to an open source project and said it can always be forked and copied with minor changes. Thus, according to Felten, ICANN’s power is more political than technical in that ICANN is *perceived* as a legitimate authority and decision maker. The industry wide consensus is we will all use the

ICANN root and it is difficult to coordinate everyone to switch to a different root. When it came to data as infrastructure, Felten characterized the proposal as some sort of mandatory data transparency regime for intermediaries. He critiqued this as overbroad because a large percentage of users on the Internet could be considered “intermediaries” that gather and store data in some way, shape, or form, even if only for a short period of time. He questioned how this mandatory regime would be applied to the smaller users.

When it comes to data trends generally and the implications for a data transparency regime, Felten said there has been a movement towards large data sets and data mining these sets and analyzing them has become quite popular. These large data sets and large data flows have massive privacy implications, he said, because identifying individual users is not difficult. Felten pointed out policy makers were just beginning to understand how large data sets and privacy are interrelated, thus making it difficult to urge anyone to release these large data sets.

Finally, Felten addressed the Internet as a complex adaptive system. He said complex adaptive systems are difficult to predict and very difficult to control. With some humor, Felten pointed out that a cat is a complex adaptive system, but “herding cats” is very difficult. Marc Berejka pushed back and said “herding cats” might be difficult, but not impossible.

### **Final Address—Is It Really An Ecosystem?**

Larry Strickling, Assistant Secretary for Communications and Information for the National Telecommunications and Information Administration (NTIA), addressed the attendees and gave the final remarks on the conference. He started by pushing back on the underlying premise of the conference, questioning many of the assertions echoed throughout the panels; Internet is *not* an “ecosystem” he said. It is not a forest or a mountain range, and unlike a true ecosystem, he pointed out, the Internet will not come back into equilibrium on its own. This is where regulation comes in.

Usually every stakeholder wants regulation, he said, but the inherent problem is how each stakeholder wants the regulation to take care of their individual interest. If there is no regulation, according to Strickling, then each network provider will put their own rules in place, resulting in a multitude of “little regulators.” Additionally, he said, without regulation users will lose trust and stop using the technology. Building trust is at the core of NTIA’s initiatives for the year, and there are four main areas: (1) Privacy—how to allow intensive use of personal information without an attendant violation of privacy; (2) Children—younger and younger users are on the Internet and there are unique issues with this change in demographics; (3) Cyber Security—how to meet the challenge of the global Internet while at the same time protecting civil liberties; and (4) Copyright Security—protecting intellectual property while allowing fair use. In these areas the government clearly has a role and there is an opportunity to give all stakeholders a “nudge” to come together and help solve these issues.

**Attachment A: 2010 Digital Broadband Migration Participants**  
(alphabetical by last name)

Meredith Attwell Baker *Federal Communications Commission—Commissioner*

Marc Berejka *Secretary's Office, United States Department of Commerce—Policy Advisor*

Kathryn C. Brown *Verizon—Sr. VP for Public Policy Development and Corporate Responsibility*

Mark Cooper *Silicon Flatirons—Senior Adjunct Fellow*  
*Consumer Federation of America—Director of Research*

Brad Feld *Foundry Group—Managing Director*

Edward Felten *Princeton University—Professor of Computer Science and Public Affairs*

Ari Fitzgerald *Hogan & Hartson—Partner*

Michael Froomkin *University of Miami School of Law—Professor*

Michael Gallagher *Entertainment Software Association—President and CEO*

Ellen Goodman *Rutgers University—Professor*

Dale Hatfield *Silicon Flatirons—Executive Director*  
*University of Colorado Interdisciplinary Telecommunications Program—Adjunct Professor*

Larissa Herda *tw telecom—Chairman, President, and CEO*

Mark Lemley *Stanford University Law School—William H. Neukom Professor of Law*

Andrew McLaughlin *United States—Deputy Chief Technology Officer*

Jon Nuechterlein *WilmerHale—Partner*

Paul Ohm *Silicon Flatirons—IP/IT Director*  
*University of Colorado Law School—Associate Professor*

Brent Olson *AT&T—Assistant Vice President for Public Policy*

Preston Padden *Walt Disney—Executive Vice President of Government Relations*

Frank Pasquale *Seton Hall Law School—Loftus Professor of Law*

Michael Powell *Providence Equity—Senior Advisor*  
*Federal Communications Commission—Former Chairman*

Jonathan Sallet *Silicon Flatirons—Senior Adjunct Fellow*  
*Glover Park Group—Managing Director*

Carl Shapiro *U.S. Department of Justice, Antitrust Division—Deputy Assistant Attorney General for Economics*  
*University of California at Berkeley—Transamerica Professor of Business Strategy and Professor of Economics (on leave)*

Howard Shelanski *Federal Trade Commission, Bureau of Economics—Deputy Director for Antitrust*

Gigi Sohn *Silicon Flatirons—Senior Adjunct Fellow*  
*Public Knowledge—President and Co-Founder*  
*U.S. Department of Commerce—Assistant Secretary for Communications and Information*

Larry Strickling

Lisa Tanzi *Microsoft*—Vice President and Deputy General Counsel for the Business Division  
Pierre de Vries *Silicon Flatirons*—Senior Adjunct Fellow  
*University of Washington, Economic Policy Research Center*—Research Fellow  
*Harris Wiltshire & Grannis*—Technology Advisor  
Phil Weiser *U.S. Department of Justice, Antitrust Division*—Deputy Assistant Attorney General  
*University of Colorado Law School*—Professor of Law and Telecommunications (on leave)  
Daniel Weitzner *U.S. Commerce Department, National Telecommunications and Information Administration*—Associate Administrator for the Office of Policy Analysis and Development  
Hon. Stephen Williams *U.S. Court of Appeals, D.C. Circuit*—Senior Judge