

**Law, Regulation and Technology:
Markets, Innovation and the Global Economy
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1. Welcome

Thank you for the kind introduction and for inviting me to join you in this splendid location. I would especially like to thank Dr. Mahmoud Daneshmand for accepting the risk of harm that my remarks may bring to his good reputation as one of AT&T Labs' new Technical Leaders. Congratulations Dr. Daneshmand on your promotion. Thank you also to Antonio Corradi of the University of Bologna for co-hosting this International Symposium.

2. Introduction

I had the opportunity to review many of your papers in the very impressive Proceedings of this Symposium and attend many of your presentations. It became clear to me almost immediately that most of you are not ready to work in the world of policy. First, you use splendid formulae complete with powers and functions. That would not do in the world of policy for we have a strict rule about numbers: Between one and ten, a policy person spells them out and above ten a policy person says "many." Secondly, you appear eager to plot your equations onto charts with mathematical precision and factual accuracy. Again, in the land of policy, this will not do. We in the land of policy have pledged ourselves to a rigid rule for charts and graphs: We do not label the axes. This is what distinguishes us as experts in policy.

When Dr. Daneshmand called this winter to ask me to speak on policy, law and regulation, it was clear to both of us what the subject would be: The policy, law and regulations

of the telecommunications and computing industry. After all, I am a dean of a school of technology management.

Then events turned sourer for the telecommunications and computer industry as hundreds of CLECs in the US and a huge provider of broadband, Global Crossings, declared bankruptcy. The enormous burden the debt load of the telecommunications industry posed for the global economy was becoming starkly evident. Mahmoud and I compared notes and decided perhaps I should add a section on the policy, law and regulation of financial operations, the management of debt and the bankruptcy code. After all, I am a professor of management.

Then in June, the headlines announced the resignation of not one but two of the major telecommunications company executives, the CEOs of WorldCom and Qwest; that WorldCom had misinformed its shareholders as to nearly \$3.8 billion of their revenues; and that grand juries were investigating throughout the United States. Mahmoud called again, this time to add a third assignment, the policy, law and regulation of the criminal justice systems. After all, I am an attorney.

So my first slide today will be a simple one: the debt to jail ratios of the telecommunications industry. As you can see, there is a direct relationship between debt and jail especially if the debt is obscured by shoddy accounting reports and self-serving legal advice. The little dip at the right of the results curve comes when the CEO hires an especially adept lawyer as defense counsel.

3. *The present and the future*

A key to leading an organization, besides being ethical and honest, is to have the capacity to run the current corporation, imagine the “next” corporation, and transition from the “now” to the “next”, that is the current to the future. In the Pentagon, in fact, we do this at least two evolutions forward. That is we run the current Navy, we procure and buy the “next Navy” and we design the “Navy after next.” Today, I would like to talk about telecommunications policy, law and regulation from a similar perspective. That is policy, law and regulation – now; the “next” or emerging policy, law and regulation; and the policy, law and regulation “after next.”

Because the time allotted is quite short, I will in turn need to be relatively quick in proceeding through this territory. If you yearn for more, then I will be fortunate to have you as lively partners for further discussion at lunch and dinner.

4. Trends in technology

As a Dean of the Howe School of Technology Management and a former Under Secretary of the Navy, you might expect that I love technology! The gains we have made in the past fifty years, combined with the new opportunities that are just appearing on the horizon, “hull down” as we say in the Navy, excite me and I am sure excite you. What do I see?

- Transformed over legacy systems
- Precision over mass
- Wireless over wired
- Unmanned over manned
- Network-centric over silos
- Knowledge over data
- Privacy over visibility
- Security over vulnerability
- Growth and stability over stagnation or decline

Looking in the same spy-glass, I see business with the potential to shift to new paradigms.

- Solutions not pieces
- Making sense of chaos
- Integrating technology into daily living
- Facilitating the customer’s innovation in usage and design of products and service

In the words of Lou Gerstner, the recently and hardly retired CEO of IBM, the new marketplace model will need the following features:

- Big but fast
- Entrepreneurial and disciplined
- Scientific and market-driven
- Able to create intellectual capital on a worldwide scale
- Deliver goods and services to a customer of one

Day to day, around the world, I see innovative workers, scientists, engineers, and executives building new companies and transforming existing corporations in this direction. Yet, there are storm clouds on both the near and far horizons that trouble me.

5. Current policy, law and regulation

First, traditional policy, law and regulation in the telecommunications area have a number of uses. These uses of policy, law and regulation include:

- the traditional “rate of return” pricing for regulated monopolies
- methods for allocating scarce resources, such as spectrum
- setting of standards for interchangeable use
- enhancing or limiting competition as we have seen so recently in the US with the preferred access rights of CLECs
- extending social good when the market is insufficient
- protecting social values, as when privacy standards are set

Much of the current situation is engaged in a shift from the more traditional “rate” regulation to policy and regulations that use the market to determine rates and encourage innovation.

Second, while the current objectives of telecommunications policy, law and regulation around the globe have different perspectives, all are paying more and more attention to one issue -- innovation.

- In the United States and the American continents, the focus has been on economic regulation with a clear shift in the past decade towards reducing the regulatory burden to enhance innovation and to reduce costs. Michael Powell, Chairman of the United States Federal Communications Commission recently recognized the FCC focus on price competition, as expressed through antitrust policy, should be shifted to a focus on Schumpeter's view that competition through innovation is more important than price competition.¹
- In Europe, while economic regulation is a part of the equation, the emphasis is equally on social good and the benefits that competition can provide the consumer. What some have suggested is needed in Europe is greater certainty and a lighter touch.
- In Asia, policy, law and regulation appear to lean towards society taking precedence over the individual. At the more extreme instances, we see sanctions on personal behavior and limitations on access to information.

Within each of these three regional accents, however, the underlying question persists about how to assure innovation and competitive pricing. But, none of us should be surprised that regional variations in approaches to the market-place are arising, now that the game is no longer the market-economy versus state-controlled economies of the Cold War, but market-economy versus market-economy around the globe.

Third, at least in the United States, the reforms of the past decade, especially the 1996 Telecommunications Act, are being reconsidered. This is partly the normal refinement of ideas and concepts that have now been exposed to practice, but also the awkward realization that not everything worked out as planned.

For instance, the clear regulatory tilt towards access to telecommunications infrastructure at preferred rates caused an enormous flow of capital (both equity and debt) into a special breed of organization, the Competitive Local Exchange Carrier (CLEC). Then almost all value in these CLECs was lost when it became clear to investors that, even with these regulatory preferences, the underlying business model did not work. From 1996 the market value of CLECs went from \$3 billion to over \$86 billion in 2000 and the plummeted back to \$3 billion in 2001.² With

enormous debt loads, often financed by the telecommunications equipment industry, CLECs went bankrupt in astounding numbers in 2001 and 2002. Now with egg on its face, the FCC is trying to explain that some CLECs are succeeding. The real lesson the FCC should hear is: Don't mess with Mother Market to this degree.

6. The next round of policy, law and regulation or refining market-based regulation

A number of new developments reflect the next round of clear thinking about telecommunications regulation.

To begin with, the practice of deregulation is being understood better. Old concepts of “command and control” regulation, such as rate of return regulation and service level standards, are being replaced by more market-based concepts, such as spectrum auctions and secondary market arrangements. As a rule, policy and regulation should lag technology, not attempt to shape technology. This means imposing less regulatory burden during early stages of growth when disruptive technologies are their most fragile. Let me give you two examples.

For instance, auctions. Using auctions to set the “entry price” for new owners of spectrum should be resisted. In the United States, the auction of 2.3 gigahertz spectrum was estimated to obtain \$3.4 to \$3.8 billion, and then revised down to \$1.4 billion. The auction itself generated \$13 to \$14 million.³ In the course of this adjustment, major players were bankrupted.

In Europe, the price of 3G licenses to Vodafone alone was 13.5 billion pounds sterling (about US\$20 billion) and for all entrants in Europe nearly 110 billion euros, equal to almost half of the 224 billion euros of annual revenues for the telecommunications industry in Europe. Last month, Vodafone announced losses were US\$20 billion, equal to its 3G licensing fees.⁴

The consequence is that the restraint on innovation has been nearly total! It would be far better to have allocated less of the auction price to an “entry fee” and more to a royalty stream from earned revenues. Few companies can afford to pay the total cost of key goods upfront, and certainly young, entrepreneurial firms cannot afford to do so. As a matter of good policy, governments should not balance their books by taking capital of such magnitude from the innovative environment of corporations. Until governments begin to show they are highly innovative users of capital, let regulatory burden lag behind the technology.

Another way to use auctions is to “price” the cost of social obligations. As one executive of GTE recently proposed, hold an auction to determine the price that providers will charge to deliver universal service functions. This will help governments understand the actual burden imposed by social obligations, encourage the marketplace to offer the most innovative methods for providing such important functions, and deliver these functions at the lowest price.

In another area, consider secondary markets. Secondary markets can be seen as a more market-based, flexible and agile way to optimize the use of limited resources. Rather than require all users to obtain licenses from the regulator, secondary markets allow the market-place to create, operate, and price additional applications on the spectrum, so long as basic guidelines are met. Both agility and flexibility are increased and the likelihood of innovative uses rises dramatically.

This fine-tuning of the policy, law and regulatory process in telecommunications -- and areas other than telecommunications could benefit from such fine-tuning -- is an essential effort for the 21st century. The last decade has had enough rough seas to warrant some probing questions – Russia’s difficult and incomplete conversion to a market economy; the East Asian collapse of 1997; the dot.com failures of 2000 and recent economic recession of the United States; and most recently, the telecommunications implosion caused by massive debts loads, excess capacity, shoddy accounting, or executive misconduct.

With a decade of post-Cold War market operations under our belts, the whole world is taking a fresh look at what makes a market-based economic system work well.

7. *The “future after next” or can we sustain the upward arrow of progress?*

As I mentioned earlier, many of the most important questions relate to the “future after next”. What will be the trends and imperatives for telecommunications policy, law and regulation two generations from now? Even if prediction is hard, especially if it’s about the future, as Yogi Berra like to say, there are trends -- both opportunities and threats -- which can help us see further forward.

You have already heard many of these key trends from Roberto Saracco. Here, briefly, are the challenges I foresee:

First, for at least the next year, the telecommunications industry will be faced with continue financial distress. The overhang of capacity, inventory and debt is not about to transform into strong demand until new applications and new users log in and push demand for bandwidth to substantially higher levels. Until then, telecommunications will be gasping for air.

Second, during the next decade, the inefficiencies of regulation; the rivalries between competing standards, first, CDMA versus GSM, now CDMA2000 versus UMTS; and hesitancy to provide “greater certainty and a lighter touch” will present the globe with a suboptimal telecommunication resource.

Third, the existing business model is broken. There are not enough customers with money to buy the products that the current manufacturing system can produce. Our lack of success during the past fifty years in adding wealth and well-being to the impoverished of the world is not comforting; indeed the gap between rich and poor is widening.

Fourth, by about 2025 the Turing test will have been passed and before 2040, the power of computing and telecommunications will have produced the “synthetic white collar worker.” Indeed, yesterday Dr. Hosein Eslambolchi demonstrated here the first off-spring of such a virtual worker. The complexity and speed with which networks must operate has led AT&T to the “Concept of Zero.” Ironically, the same telecommunications and computing industry that will be major force in giving the 9 billion citizens of the world of 2040 easy and open access to knowledge and economic development, may also be a force in creating a world where these same 9 billion people have nothing to do and nothing to spend. To paraphrase a famous labor leader of the 1940s, “How many “Zeroes” will buy a cell phone?” Without work, customers have no money to spend. They are true “Zeroes.”

While I have great hope for the role of telecommunications and computing in the 21st century, if we do not solve the problems of work, value, the money to buy goods with – in essence, if we do not close the gap in wealth -- this is a story with a tragic ending.

The future appears to require three things: first, a new concept of work that entails more than making goods; second, a means of teaching citizens throughout the world how to innovate and create wealth from these new activities; and third, a substantial diminishment in the

resources consumed doing one and two. For all three of these, I believe innovation in the telecommunications and computing industries offers some of our best hope.

First, in high broadband systems, we have the potential of many new forms of knowledge and entertainment being exchanged for value around the world. This alone could vastly improve commerce and business, education and learning, health and longevity, entertainment and artistic expression, and global understanding.

In the words of Christopher T. Marsden in his delightful article, *Cyberlaw and International Political Economy: Towards Regulation of the Global Information Society*: The digitization of the economy will be as profound as Fordism and will be based on digital networks.⁵ Fordism is his shorthand for mass production and that is the modern scientific management introduced by Stevens Institute's own Frederick Winslow Taylor.

Second, the Internet and other information systems have the makings of universal and nearly free access to facts, ideas, and knowledge. This could vastly improve our ability to teach citizens throughout the world how to innovate and create value.

Third, both telecommunications and computing have the prospect of dramatically reducing resource consumption. Virtual work and travel, along with efficiencies in logistics, can reduce the use of fuels. Micro and nano-scale products will significantly reduce power consumption. And most jobs in the future world of telecommunication and computing will be based on using bits not consuming resources.

Having set the stage in this fashion – the future well-being of the globe is at risk and innovation in the telecommunications and computing industries constitutes one of humankind's best hopes – let me close with my thoughts about the “future after next” for telecommunications policy, law and regulation. Indeed, the “future after next” of all policy, law, and regulation.

First, policy should and can be balanced between an emphasis on both economic productivity and social and individual well-being. Freedom encourages development and development supports freedom. Amartya Sen, the Nobel Prize winning economist and Master of Trinity College at Cambridge University eloquently makes this case in his recent book *Development as Freedom*.⁶ I highly recommend it to you.

Second, institutions that can authoritatively provide global policy, law and regulation must be encouraged. The world of nation-states is being eclipsed by the scale of global communications and commerce. Now many of the major opportunities and problems facing the globe cannot be solved at the nation-state level because the opportunities and problems are bigger than any one nation. Certainly, we can see this in the case of wireless standards, where we were once pleased if large regions could agree on a standard, but now see that global standards are necessary. We see it too in areas like the security of our ports, where many nations and companies will have to join together if we are to fashion an efficient and effective solution to this gaping vulnerability in global security.

Telecommunications has had a global organization for over a century, the International Telecommunications Union (ITU). Now, with the advent of the World Trade Organization, we have a second major international body attempting to provide global policy, law and regulation. And there are others. This is a positive development.

Third, we need to study, design, test, and refine policy and regulatory tools – along with corporate decision making and ethics -- that meet the challenge of encouraging innovation and cost efficiency while also providing sufficient credibility and flexibility for firms to raise capital and earn reasonable returns. This means that the call of the United States for market reforms throughout the rest of the world must now be heard with equal clarity within the United States.

Fourth, we need telecommunications policy, law and regulation that support and encourage the efficient and fair distribution of information, knowledge, learning and education throughout the world. In other words, teach the world how to innovate. At least two goals need to be met. First, help individuals earn money by creating economic value and social goods using fewer physical resources. This gives people self-worth, creates customers, and leads to a sustainable environment. Second, increase the awareness throughout the world that we are all responsible for providing a safe, stable and peaceful world in which to live our lives. This too is good for the human soul – and good for business.

8. Conclusion

In conclusion, the challenges to telecommunications policy, law and regulation are significant. Having looked at the near-term, the mid-term, and the long-term, I believe the

continued shift to market-based regulation will continue, but more important will be finding a “third-way” that balances market efficiency with social and individual well-being. While in the short-run, a “third-way” may appear to reduce the freedom of the marketplace to pursue efficiency and effectiveness, freedom – certainly freedom on a global scale -- cannot be attained without equivalent development throughout the world at the same time.

Because telecommunications and computing are so fundamental to the future of a fully developed world, it is essential that telecommunications policy, law and regulation promote development just as firmly as freedom.

Underlying all of this is the central importance of innovation. We at Stevens Institute are firmly committed to teaching the world how to innovate. You, as members of the telecommunications industry, have been tremendous innovators. If we can continue to innovate, including innovate in the policy, law and regulation of telecommunications, we have a chance of creating the “future after next” that will help the world succeed in this coming century.

Thank you. I would be pleased to take your questions.

¹ Remarks of Michael K. Powell before the Progress and Freedom Foundation, “The Great Digital Broadband Migration,” December 8, 2000.

² Thomas M. Lenard, *The Economics of the Telecom Meltdown*, Progress on Point, The Progress and Freedom Foundation, Release 9.6, February 2002, p3-5.

³ Brian Fontes, *Suggestions for Regulation by the Federal Communications Commission*, 2001 Law Review of Michigan State University-Detroit College of Law 263, 268.

⁴ Paul Meller, *New Economy*, Wall Street Journal, Monday, June 24, 2002, pC4

⁵ Christopher T. Marsden, *Cyberlaw and International Political Economy: Towards Regulation of the Global Information Society*, 2001 Law Review of Michigan State University-Detroit College of Law 355, 360.

⁶ Amartya Sen, *Development as Freedom*.