DECISION MAKING IN THE FACE OF COMPLEX AMBIGUITY:
MAPPING THE FCC'S ROUTE TO THE BROADBAND NETWORK COMPACT

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EXECUTIVE SUMMARY

This paper demonstrates that the FCC faces a situation of complex ambiguity in which simple solutions are inadequate. Ambiguity exists where decision makers lack knowledge about both the nature of outcomes of actions and the probabilities of those outcomes. Complexity exists where more than one aspect of a decision is subject to ambiguity.

The paper notes that decision makers in many fields face the challenge of complex ambiguity and tools for improving decision making have been developed. Although the analytic approaches come from many disciplines – financial portfolio analysis, project management, technology risk assessment, Black Swan Theory, military strategy and space exploration – the decision making frameworks have strong commonalities. The digital communications sector exhibits characteristics that make it a good candidate for the application of these analytic frameworks.

- Because it a recursive, scalable infrastructure network that is critical to a broad range of activities in society, reliability, interconnection, interoperability, ubiquity, and affordability are highly desirable attributes that are the goals of public policy.
- It has undergone recent dramatic changes that disturb the basic economics and the basic legal structure of the sector

Most importantly, the efforts to develop decision making frameworks in these diverse fields yield a very clear set of recommendation for how to build portfolios of assets to achieve goals in the face of complex ambiguity.

Reviewing the history of the classification of High Speed Data Transmission (aka Broadband Internet Access Service), it is clear that both the authority and the power of the FCC to take actions to ensure network neutrality have been unclear since the passage of the Telecommunications Act of 1996. The United States Court of Appeals For The District Of Columbia Circuit ruling continues and compounds that complex ambiguity.

Applying the principles of strategic decision making to the terrain of decision making on which the FCC finds itself, we conclude that the prudent strategy should include the following actions.

- The FCC should assert the independent authority and explore the powers it has under several of the key, new Sections of the '96 Act to create a robust portfolio of tools to pursue the core goals of the Communications Act
- Maximize the power of transparency under Section 706 to promote competition and provide consumer protection.
- Develop regulation of reasonable network management to the greatest extent possible under Section 706.
- Implement effective universal service mechanisms under Section 254.
- Explore Title II with forbearance (Section 10) for those goals of the Act that cannot be accomplished under the authorities and powers of sections 706 and 254, particularly for public safety, consumer protection and consumers with disabilities and privacy.

The FCC can pursue all four of these options simultaneously by conducting different proceedings on different schedules. The idea that the FCC would have this split, even fragmented

jurisdiction for different sections of the Act may seem odd, but that has always been a fact of life under the Act. Not only has the Congress given it different powers and authorities in different Titles, but the split basis for authority for network management was the situation for over thirty years under the Computer Inquiries, which rested on Title I ancillary authority applied to Title II common carriers. Jurisdictional inconsistency is the rule, rather than the exception in the complex communications space.

Given two decades of complex ambiguity in this space, it is a mistake to think that any one of the sources of power and authority is enough. The approach recognizes and adapts to the new legal terrain, keeps options open, seeks to quickly implement new rules and places only a specific set of assets at risk. It not only keeps options open, but advances the principle of building resilience through redundancy and diversity of authority and power.

It also heads in an important system building direction, since Sections 706 and 254 are systemic tool that cuts across the key Titles and definitions of the Act. This is the "new" law that needs to be developed. Until the Commission tries to do so, the courts will likely send it back to the drawing board.

It would be a luxury to hit the pause button and take time to reflect on this complex challenge, but the law does not allow it and the political process, reflected in instantaneous caricatures, does not treat delay kindly. Decisions about appeal must be made quickly. Thus, one of the most important direction setting decisions comes early. The Commission has chosen to explore the power it has under section 706, while continuing to develop the other regulatory approaches. This paper demonstrates why it made the right choice.

Sections 706 and 254 are new mechanisms that the Congress adopted to deal with a perennial problem encountered by policy in the communications space. Communications technology is dynamic, but law is static.

If the 1996 law were written differently, or the decision to classify broadband as an information service (which is now over a decade old) had not been taken, the terrain would be very different and the best strategy for writing the Broadband Network Compact might be different. But, the Commission must navigate the terrain in which it finds itself, not in some alternative universe. The "all of the above" approach makes perfect sense for the FCC to pursue when confronting the complex ambiguity that has typified the terrain of communications policy since the passage of the 1996 Act. The first step is to explore the full extent of the authority and power the Commission has under Section 706 (and Section 254), while invoking Title II where additional authority and/or power are needed.

In an editorial in which the New York Times opined on the decision to pursue section 706, it cautioned that "Having failed twice to write rules acceptable to the appeals court, the F.C.C.'s credibility is at stake. It has to prove that its latest strategy can work."[1] It went on to claim that "reclassifying broadband… is more likely to survive a court challenge than using the F.C.C.'s power to promote broadband." While we disagree with that assessment, we can agree that the ability to reclassify is very far from a certainty. Under the conditions of complex ambiguity, a strategy that "can work" involves a sequence of choices that preserve options and layer outcomes, rather than making a simple binary choice. The "new" law changing the terrain of decision making that needs to be explored is section 706 and section 254.

I. INTRODUCTION

The reaction to the recent ruling by the United States Court of Appeals For The District Of Columbia Circuit[2] that vacated the Federal Communications Commission's (FCC) Open Internet Order[3] underscores the complex challenge that continues to confront the FCC in implementing the Telecommunications Act of 1996 (the 1996 Act) almost two decades after its enactment. Although the court rejected the FCC attempt to establish a framework for regulating network management practices, like discrimination between service providers or blocking of the flow of data, the D.C. Appeals Court ruled that the FCC has the authority to establish such a framework under Section 706 of the Act. It further ruled that in finding that the current deployment of broadband services is inadequate, it had already passed the primary threshold for exercising section 706 authority. At the same time, it established very strict limitation on what the regulatory framework could look like. It granted the FCC broad authority but limited its power.

Some liberal groups were alarmed by what they saw as a potential increase in the authority of the FCC. Even though the courts have consistently narrowed the FCC power since the passage of the 1996 Act and in spite of the fact that even the modest regulatory actions the FCC took in the Open Internet Order were found to be too aggressive for Section 706 authority, they fear that the courts would allow the FCC (not to mention the states) to reach past the broadband service providers it has been trying (but failing) to regulate and regulate the rates and services of Internet applications providers.

> The Court did not just uphold the FCC's construction of Section 706, but it did so in sweeping terms… it ruled that the FCC was fully justified in finding a link between creating an open Internet and acceleration of broadband deployment… It said that the Commission's authority to promulgate regulations that promote broadband deployment encompasses the power to regulate broadband providers' economic relationships with edge providers if, in fact, the nature of those relationships influences the rate and extent to which broadband providers develop and expand services for end users....
>
> although it probably wouldn't do so, the FCC rather clearly has authority to regulate rates, not only for ISP's but for any service connected to the Internet, such as Netflix…. The majority in Verizon v. FCC applied that principle to give the FCC everything that it needed - and more - except for what it wanted the most. We may be living with the consequences for a long time.[4]

Some conservative groups were even more alarmed, not only worrying about a vast expansion of FCC authority in the Court's ruling to reach into applications and services at the edge of the network, but also raising the specter of common carrier regulation of broadband communications carriers at the center of the network.

> This starts to look a lot like common carriage regulation by another name. Indeed, it's not clear why the FCC couldn't regulate *any* information services or, say, interconnected aspects of smart washing machines or Nest-like thermostats. The FCC would just need a plausible argument that it was boosting broadband demand.
>
> Congress intended Title I as a light-touch approach to promote investment and innovation in "information services" while allowing public safety regulations like e911. Now, through Section 706, the FCC can impose economic regulation, too, so long as it doesn't amount to common carriage — which may be no limitation at all. That's cause for concern.

> The FCC could exceed the "no common carriage" limit, saying no to one deal after another without a court ever getting to question what amounts to *de facto* common carriage. And that could be a death by a thousand cuts. [5]

However, other liberal groups read the decision in the exact opposite way and were distraught over the severe limitations the ruling placed on the power of the FCC to regulate broadband communications carriers.

> On Jan. 14, 2014, the U.S. Court of Appeals for the D.C. Circuit struck down the Federal Communications Commission's Open Internet Order in the case of Verizon v. FCC.
> Translation: This court just killed Net Neutrality.
> Internet service providers are now able to block any website or app they want. That means they can decide what you can do and where you can go online.
> This decision is a massive blow to the Internet as we know it. But the FCC has the ability to change this by reversing a series of bad decisions made during the Bush and Obama administrations and reasserting its authority to protect Internet users…
> What all this means is that the fix for the Open Internet is actually easy: The FCC needs to reverse its prior decisions and "reclassify" Internet access services "telecommunications services" under the law and treat ISPs as the "common carriers" they already are.[6]

The FCC's decision to rewrite the Open Internet Order under the court ruling has unleashed another round of similar comments.[7]

The distinction between authority and power, concepts that are basic to political science, [8] is just one of many complexities the FCC faces in responding to the D.C. Appeals Court ruling. This paper argues that the growth of digital communications and the 1996 Act amendments to the Communications Act of 1934 (the 1934 Act)[9] have created conditions of complex ambiguity in the Federal Communications Commission's decision space. The recent opinion of the D.C Appeals court continues and compounds that complex ambiguity.[10]

The complexity of the new terrain of decision making on which the FCC finds itself makes simplistic caricatures of policy challenges and choices, like the ones noted above, far too uni-dimensional and narrow to chart a prudent course. This is an ideal moment to take a fresh look at the complex challenge facing the FCC in achieving the goals of the Communication Act.

This paper provides an analysis of the seemingly endless legal wrangling over the classification of High Speed Data Transmission (aka: Broadband Internet Access) Service from the perspective of a theory of decision making I call multi-criteria portfolio analysis. While I have written at length about the classification of High Speed Data Transmission from the emergence of the issue over a decade ago[11] and have applied multi-criteria portfolio analysis extensively in another sector (resource acquisition in the electricity sector), [12] I have not previously applied this decision making framework to the issue.

The communications sector exhibits several characteristics that make it a particularly good candidates for decision makers to apply an approach that endeavors to directly deal with complex ambiguity. [13]

- It is a recursive, scalable infrastructure network that is critical to a broad range of activities in society.

- As a result, reliability, interconnection, interoperability, ubiquity, and affordability are highly desirable attributes that are the goals of public policy.
- The communications sector is not only increasingly central to the economy, but also has the unique characteristic that it is central to the polity, since it is the central vehicle for speech, and this increases the complexity that decision makers face.[14]
- The tension between a desire to rely on market competition and the need to preserve the network attributes deemed to be vital puts a great deal of pressure on regulators, particularly in the transition from traditional regulation to a much lighter regulatory regime. [15]
- It has undergone recent dramatic changes that disturb the basic economics of the sector.
- It has undergone recent dramatic changes that disturb the basic legal structure of the sector

The paper is divided into three sections.

Section I presents the multi-criteria portfolio framework for decision making in an environment of complex ambiguity.

Section II presents evidence that the FCC faces a condition of complex ambiguity in the classification of High Speed Data Transmission and must navigate a new legal terrain in its effort to exercise its authority to achieve the goals of the Communications Act.

Section III concludes the paper by applying the framework from Section I to the assessment of the terrain of classification of High Speed Data Transmission in Section II to evaluate the FCC's policy options. It suggests a strategy for moving toward the Broadband Network Compact.

II. PORTFOLIO ANALYSIS OF COMPLEX AMBGUITY

DEFINING THE TERRAIN OF DECISION MAKING

How does one make effective decisions in an environment where the impacts of significant events, actions or policies are unclear (outcomes unknown) and the occurrence of those events, action or policies is unpredictable (the probabilities are unknown)? As shown in Figure II-1, the analysis starts from the premise that decision makers are confronted with two dimension of knowledge create of ambiguity. In my terminology ambiguity arises where the decision maker faces a lack of knowledge about both outcomes and probabilities. Complexity arises where ambiguity affects more than dimension of the action or decision.[16] The two sources of ambiguity create four regions of knowledge – risk, uncertainty, vagueness and the unknown. Decision makers will encounter different problems and challenges in each of the regions.

FIGURE II-1: AMBIGUITY DEFINED BY FOUR REGIONS OF KNOWLEDGE

Knowledge About Probabilities of Outcomes

Vagueness: The decision maker may not be able to clearly identify the outcomes, but knows that the system will fluctuate.	**Risk:** The decision maker can clearly describe the outcomes and attach probabilities to them.
Unknowns: In the most challenging situation, knowledge of the nature of the outcomes and the probabilities is limited.	**Uncertainty:** The decision maker can clearly describe the outcomes but cannot attach probabilities to them.

Knowledge about Nature of Outcomes

The modern underpinnings of this analysis go back almost a hundred years to the discussion of Knightian uncertainty, which first distinguished between uncertainty and risk (see Table II-1).[17] In the past half century, and particularly the past two decades, the effort to map the terrain of knowledge to improve decision making has received a great deal of attention in fields as diverse as financial portfolio analysis, project management, technology risk assessment, Black Swan Theory, military strategy and space exploration.[18]

Table II-1 identifies three aspects of the regions of knowledge based on three of these major fields. The topographic features of the terrain of knowledge show the primary challenge created by the key unknowns that confront policy makers in each of the regions of knowledge. Under the navigational devices I include the analytic approaches, methods and focal points of analysis that improve the ability to navigate in the regions. Under the navigational principles I include the observations on processes, instruments and specific advice for building systems to accomplish goals.

Table II-2 provides citations to convey the nature of the recommendations for policy. Technology Risk Assessment and Black Swan Theory both draw heavily on biological and ecological sciences for their recommendations. Both analogize and emphasize the importance of insurance and look to natural forms, such as redundancy, flexibility and adaptability. Examples of the simplest and most penetrating advice for policy makers in the face of complex ambiguity include the following

- "Put lots of eggs in lots of baskets."[19]

- Simply put, don't get yourself in the Fourth Quadrant (Unknown/Unknowns)… learn to love redundancy… one can buy insurance, or construct it, to robustify a portfolio… Avoid prediction of small-probability pay offs.[20]

The navigational principles provide guidelines for making specific choices, which will be discussed below.

TABLE II-1 MAPPING AND EXPLORING THE TERRAIN OF KNOWLEDGE

FEATURES	REGIONS OF KNOWLEDGE			
TOPOGRAPHY	UNKNOWNS	VAGUENESS	UNCERTAINTY	RISK
Technology Risk Assessment				
Challenges	Unanticipated effects	Contested framing	Nonlinear systems	Familiar systems
Outcomes	Unclear	Unclear	Clear	Clear
Probabilities	Unpredictable	Predictable	Unpredictable	Predictable
Black Swan Theory				
Challenges	Black Swans Wild randomness	Sort of Safe	Safe	Extremely safe Mild randomness
Conditions	Extremely fragile	Quite robust	Quite robust	Extremely robust
Distributions	Fat tailed	Thin tailed	Fat tailed	Thin tailed
Payoffs	Complex	Complex	Simple	Simple
Project and Risk Mitigation Management				
Challenges	Chaos	Unforeseen uncertainty	Foreseen uncertainty	Variation
Conditions	Unknown/unknowns	Unknown/knowns	Known/unknowns	Known/knowns
NAVIGATION DEVICES				
Framework	Multi-criteria analysis	Fuzzy logic	Decision heuristics	Statistics
Analysis	Diversity assessment	Sensitivity analysis	Scenario analysis	Portfolio evaluation
Focus	Internal resources & structure	Internal resources & structure	External challenges	External challenges
NAVIGATIONAL PRINCIPLES				
Processes	Learning	Adapting	Planning	Controlling
Instruments	Insurance/diversity	Monitor & Adjust	Optionality	Hedging
Advice				
TECHNOLOGY RISK ASSESSMENT Precaution Buy insurance Accept non-optimization Diversity Variety Balance Disparity	BLACK SWAN THEORY Truncate Exposure Buy insurance Accept non-optimization Redundancy Numerical Functional Adaptive	TECHNOLOGY RISK ASSESSMENT Resilience Adaptability BLACK SWAN THEORY Multi- functionality What Works	TECHNOLOGY RISK ASSESSMENT Flexibility Across Time Across Space BLACK SWAN THEORY Optionality	TECHNOLOGY RISK ASSESSMENT Resilience Robustness Hedge BLACK SWAN THEORY Robust to Error Small, Confined, Early Mistakes Incentive & disincentives Avoid Moral Hazard Hedge

Sources: Nassim Nicholas Taleb, *The Black Swan* (New York: Random House, 2010), Postscript; Andrew Stirling, *On Science and Precaution in the Management of Technological Risk* (European Science and Technology Observatory, May 1999), p. 17, *On the Economics and Analysis of Diversity* (Science Policy Research Unit, University of Sussex, 2000), Chapter 2; "Risk, Precaution and Science; Toward a More Constructive Policy Debate," *EMBO Reports,* 8:4, 2007; David A. Maluf, Yuri O. Gawdisk and David G. Bell, *On Space Exploration and Human Error: A Paper on Reliability and Safety,* N.D.; Gele B. Alleman, *Five Easy Pieces of Risk Management,* May 8, 2008; see also, Arnoud De Meyer, Christopher H. Lock and Michel t Pich, "Managing Project Uncertainty: From Variation to Chaos," *MIT Sloan Management Review,* Winter 2002. Campden, Alan D.., 2010, Cyberspace Spawns a New Fog of War, *SIGNAL Magazine,* Bland, Eric, 2010, Fog of War Demystified by Financial 'Power Law,' *Discovery News,* January 7.

TABLE II-2: DEFINING POLICY RULES FOR THE REGIONS OF KNOWLEDGE

Technology Risk Analysis

Knowing your ignorance is the best part of knowledge. Precaution: Specific methods, techniques, instruments or measures which implement an approach which directly addresses the problems of multidimensionality, incommensurability and ignorance. (a: 40)

Diversity: diversity remains effective (at least in part) *even if the source or modalities of the prospective disruptions are effectively unknown* By maintaining an evenly balanced variety of mutually disparate options, we may hope to resist impacts on any subset of these, even if we do not know in advance what these impacts might be. parallel series of different strategies Diversity => the inclusion
of options which appear to perform less well as an insurance against changes in performance in other options (a: 27)

Variety: e.g. the number of functionally redundant – but morphologically or operationally distinct – options sustained in parallel (b: 39)

Balance: the pattern in the apportionment across the relevant categories of the options. (b: 39)

Disparity: the nature and degree to which the categories themselves are different from each other (b: 40)

Flexibility

Capacity to retain as many options for as long as possible in advance of commitment, and

Ability to withdraw (when commitment is made) without great penalty if prohibitive conditions arise (a: 27)

Resilience: capacity to sustain performance under external perturbation (b: 2

Robustness: The capacity to sustain performance under extreme perturbation maintaining an established internal structure

Adaptability: The capacity to sustain performance under external perturbation by changing internal structures (a: 27)

Black Swan Theory

The Black Swan attempts to provide a map of where we get hurt by what we don't know, to set systematic limits to the fragility of -- knowledge. and to provide exact locations where these maps no longer work (347) The most obvious way to exit the Fourth Quadrant is by "truncating," cutting certain exposures by purchasing insurance, when available (370); One can buy insurance, or construct it to "robustify" a portfolio (371)

Redundancy equals insurance and the apparent inefficiencies are with the cost of maintaining these spare parts and the energy needed associated – to keep them around in spite of their idleness exact opposite of redundancy is naïve optimization (312)

Numerical, functional, adaptive: The availability of spare parts, where the same function can be performed by identical elements, very often the same function can be performed by two different structures. When an organ can be employed to perform a certain function that is not its current central one (316- 317). Species density: Based on the nonlinearity in damage, spread the damage … larger environment are more scalable allowing the biggest to get even bigger, at the expense of the smallest… the successful killer will spread vastly more effectively (317)

Avoid over-specialization, promote optionality
The organism with the largest number of secondary uses is the one that will gain the most from environmental randomness and epistemic opacity (318) Optionality – since you have the option of taking the freebie from randomness(319) Compensate complexity with simplicity (375)

Robust to error: Nothing should ever become too big to fail. What is fragile should break early, while it is small (374). Big is ugly & fragile: Mother Nature does not limit the interactions between entities; it just limits the size of the units (314)

Confine mistakes The idea is simply to let human mistakes and miscalculations remain confined and to prevent their spreading through the system (322)

Durability: Things that have worked for a long time are preferable (371) No Socialization of losses and privatization of gains (374).
No incentives without disincentives (375)

Reliability & Risk Mitigation

Development of critical technologies that **provide system resiliency will enable future systems to adapt and recover from these unanticipated problems. …**

Current technologies are not optimal for carrying out effective risk mitigation as they lack significant capability to assess system condition or to validate system performance. **System robustness, redundancy and capability for rapid recovery are currently inadequate….**

NASA space exploration should largely address a problem class in reliability and risk management stemming primarily from human errors, system risk and multi-objective trade-off analysis, by conducting research into system complexity, risk characterization and modeling, and system reasoning... Development activity will have to support **risk analysis, design robustness, failure modeling, and system trade-offs** through the entire lifecycle of the enterprise, with **particular emphasis on early-phase capabilities.**

Development of *tools for identifying, assessing and trading risks* before and during formulation…

Development *of safety and risk related systems analysis tools* combines two thrusts, **addressing a) how risk profiles can be maintained and utilized through the fully lifecycle**, and b) **how system evolution affects designs.**

Development of methods and tools that constitute a human learning 'feedback' loop. Their goal is to improve *our understanding of the factors that contribute to aerospace accidents* and to develop ways to use that experience to improve designs.

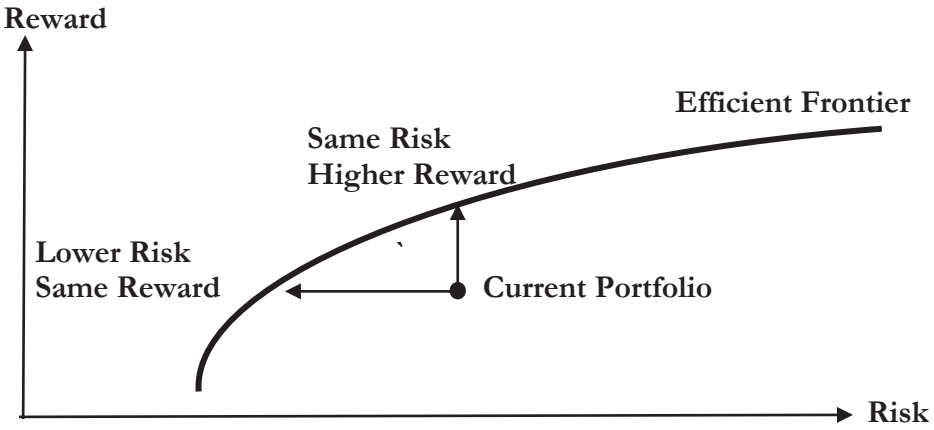
Sources: See Table II-1.

EXPLORING THE REGIONS OF KNOWLEDGE

The Portfolio Approach

Figure II-2 presents the basic approach to portfolio analysis, as a publication from the National Regulatory Research Institute attempted to introduce it to regulators.[21] It captures the idea of trading risk (probabilities) and reward (outcomes). Investors want to be on or move toward the efficient frontier, where risk and reward are balanced. They can improve their expected returns if they can increase their reward without increasing their risk, or they can lower their risk without reducing their reward. I use the portfolio approach, developed for the region of risk in the financial sector, as the analytic methodology applied in all the regions of knowledge.

FIGURE II-2: PORTFOLIO APPROACH TO RISK/REWARD,



Source: Ken Costello, *Making the Most of Alternative Generation Technologies: A Perspective on Fuel Diversity,* (NRRI, March (2005), p. 12, upper graph.

The Regions of Knowledge

Table II-3 presents the characteristics of each of the regions of knowledge and the advice for navigating in each in simple terms.

TABLE II-3: SEQUENCING DECISIONS BASED ON THE MAP OF THE TERRAIN OF KNOWLEDGE

Region of Knowledge	Challenge Outcome	Probability	Strategy	Action
Risk	Known	Known	Hedge	Identify the trade-offs between cost and risk. Spread and hedge to lower portfolio risk by acquiring assets that are uncorrelated (do not overlap).
Uncertainty	Known	Unknown	Real Options	Buy time to reduce exposure to uncertainty by hedging to the edge of flexibility and by choosing sequences of hedges that preserve the most options. Acquire small assets with short lead times and exit opportunities
Vagueness	Unknown	Known	Fuzzy Logic	Avoid long-term paths that are least controllable. Minimize surprises by avoiding assets that have unknown or uncontrollable effects. Create systems that can monitor conditions and adapt to change to maintain system performance.
Unknowns	Unknown	Unknown	Diversity & Insurance	Buy insurance where possible, recognizing that diversity is the best insurance. Build resilience with diversified assets by increasing variety, balance and disparity of assets. Fail small and early. Avoid relying on low probability positive outcomes and betting against catastrophic negative outcomes.

Risk - Hedging to increase rewards: In some circumstances the decision maker can clearly describe the outcomes and attach probabilities to them. Risk analysis allows the decision maker to spread and hedge risk by creating a portfolio that balances more and less risky assets, particularly

ones whose variations are uncorrelated. The most attractive assets to add to the portfolio are those that are not positively correlated with the other assets in the portfolio. Assets that are negatively correlated, lower the average risk of the portfolio, while assets that are positively correlated increase risk. This risk analysis has it origin in the financial sector and was first articulated over half a century ago. The statistical methods that lie beneath risk-based probability analysis have been the primary targets of criticism in Black Swan Theory and Technology Risk Analysis because the underlying distribution of outcomes assumed in statistical analysis is frequently inappropriate and gives a false sense of knowledge about the occurrence of events.

Uncertainty - Real Options to buy time: In some circumstances the decision maker can clearly describe the outcomes but cannot attach probabilities to them. Here the decision maker would like to keep options open by not deciding, if the wait to decide can yield more information that leads to better decisions. If the decision maker cannot wait, then the path chosen should be flexible, so that it affords the opportunity to deal with whatever outcomes occur. Real option analysis also emerged from the financial sector – a little over a quarter of a century ago. For the purpose of this analysis, the critical question is when must a decision be made? The analysis suggests not foreclosing options until the moment when the integrity of the system could be put in jeopardy by waiting, which shifts the value in favor of action.[22]

Vagueness – Fuzzy Logic to adapt to uncontrollable outcomes: In yet another circumstance, decision makers may not be able to clearly identify the outcomes, but they know that the system will fluctuate. Here the decision maker wants to avoid areas of vagueness. If vagueness cannot be avoided, the decision maker should take an approach that can monitor the condition of the system and adapt as it changes. An approach to this situation of vagueness called "fuzzy logic" emerged from the computer science and engineering fields at about the same time as real option analysis.

The Region of Unknowns – Insurance and diversity to avoid or survive surprises: In the most challenging situation, knowledge of the nature of the outcomes and the probabilities is limited. Even in this state of ignorance, decision makers have strategies to cope and policies that can insulate the system. Here the analyst looks more inward, to the characteristics of the system to identify those that are most important. The decision maker seeks to build robust systems that ensure the critical internal functions are performed adequately to maintain system viability under the most trying of circumstances. This framework has been developing for about two decades in technology risk assessment and Black Swan Theory.

PRINCIPLES FOR NAVIGATING THE TERRAIN OF KNOWLEDGE

Unlike financial markets, where assets are generally highly liquid, deploying technology resources and making regulatory decisions tend to be lumpy and illiquid. In these circumstances, additional advice about the sequencing of decisions can be derived from theories of decision making in complex, ambiguous situations.

Hedging against risk is the obvious cornerstone of portfolio building, but it turns out that risk is the easiest region of the terrain of knowledge to navigate. Responding to uncertainty, real option analysis informs the decision maker about which hedges to buy first. Assessment of vagueness can identify pathways, or longer term sequences of choices to pursue that would avoid uncontrollable effects. The general advice in the region of the unknowns to pursue diversity as a

source of robustness is reinforced by the observation that assets and policies that can be shared or support multiple technologies or contribute to system robustness generally are particularly attractive.

Decision makers should examine the alternatives that are preferred based on risk, vagueness and uncertainty for evidence that surprises could be lurking beyond the area where the analysis has shed light. Ensuring that the system is functional (i.e. has sufficient resources) is a paramount consideration. When analyzing sufficiency, time is of the essence. Long term predictions are extremely ambiguous. Flexibility requires that options are kept open as long as possible. The decision making time frame for incremental decisions should be only as long as the longest lead time of the options being considered. If there are preferable options with shorter lead times, then they should be chosen,as long as they achieve system sufficiency, since there will be adequate time to bring the inferior option online later, if or when the preferable options are exhausted. Unintended consequences are important to consider. One major unintended consequence to look for is inconsistency in recommendations from the other three regions.

The increasingly interconnected, recursive, scalable nature of the digital age creates the conditions in which complex ambiguity confronts decision makers with increasing frequency and great force and impact.[23] The transformation of society by digital communications systems requires a new approach to decision making that is better able to deal directly with the increasingly complex ambiguity. Widespread recognition and adoption of this approach in society suggests that policy makers can have confidence that this is a prudent approach.[24]

III. COMPLEX AMBIGUITY AFFECTING OPEN INTERNET AND UNIVERSAL SERVICE IN THE BROADBAND ERA

The analytic framework provides an approach for organizing knowledge about the situation facing the FCC and selecting the actions that give it the best chance of reaching its goals. It is a tool that requires two critical steps be taken before it can be applied.

- In order to navigate, you must know where you want to go. The framework does not define goals.
- In order to navigate, you must have information about the terrain that is to be traversed. The framework only illuminates the terrain, it does not create it.

THE BROAD GOALS OF THE COMMUNICATION ACT

The Chairman of the FCC, on the job for less than two months, has been thrown in the vortex of the Broadband Internet Access tornado. In his first speeches he "talked about the importance of what I call the Network Compact. It has four key elements – universal accessibility, reliable interconnection, consumer protection, and public safety and security."[25] In his reaction to the D.C. Appeals court ruling vacating the Open Internet Order the Chairman declared "We will consider all available options, including those for appeal, to ensure that these networks on which the Internet depends continue to provide a free and open platform for innovation and expression, and operate in the interest of all Americans."[26] In announcing the agency's official response, the Chairman reiterated the goals

> In its *Verizon v. FCC* decision, the United States Court of Appeals for the District of Columbia Circuit invited the Commission to act to preserve a free and open Internet. I intend to accept that invitation by proposing rules that will meet the court's test for preventing improper blocking of and discrimination among Internet traffic, ensuring genuine transparency in how Internet Service Providers manage traffic, and enhancing competition. Preserving the Internet as an open platform for innovation and expression while providing certainty and predictability in the marketplace is an important responsibility of this agency.[27]

Of course, the Commission must implement the law as enacted by Congress and interpreted by the Courts. The Chairman's pursuit of a "Broadband Network Compact" is a shorthand way of describing the central goals of the Communications. Those goals are embodied in a series of statements of purposes and descriptions of authority and power in various sections of the Act, as summarized in Figure III-1. Figure III-1 emphasizes the relationship between the broad statement of goals contained in the first sentence of the 1934 Act and the specific grants of authority and power contained in the subsequent sections of the Act. Since authority and power are the central issues being litigated, this structure is extremely important to the analysis.

The paper focuses on the two issue that are at the top of the list – universal service and network neutrality (which encompasses interconnection). Beyond the fact that these issues are top of mind for the Chairman, they are also at the core of the Communications Act. Universal service is the first goal mentioned in the first sentence of Title I of the Act and elaborated in Title II of the Act. Nondiscriminatory interconnection and carriage is taken up in the first two sections of Title II of the Act.

FIGURE III-1: TITLE I GOALS AND TITLES II AND III TOOLS OF THE COMMUNICATIONS ACT

EXTENSION OF LINES

(a)…No carrier shall discontinue, reduce or impair service to a community, unless and until there shall first have been obtained from the Commission a certificate that neither the present nor future public convenience and necessity will be adversely affected thereby…
(d) The Commission may after full opportunity for hearing, in a proceeding upon complaint or its own initiative without complaint, authorize or require by order any carrier, party to a proceedings, to provide itself with adequate facilities or require for the expeditious and efficient performance of its services as a common carrier and to extend its line…

UNIVERSAL SERVICE

S. 254 (b) Universal Service Principles – The Joint board and the Commission shall base policies for the preservation and advancement of universal service on the following principles:

(1) Quality and Rates –Quality services should be available at just reasonable, and affordable rates. (2) Access to Advanced Services – Access to advanced telecommunications and information services should be provided in all regions of the nation.

S. 254 (c) (1) Universal service is an evolving level of telecommunications service that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services. The Joint Board in recommending, and the Commission in establishing definitions of the services that are supported by Federal Universal service support mechanisms shall consider the extent to which such telecommunications services

(a) are essential to education, public health or public safety; (b) have, through the operation of market choices by customers, been subscribed to by a substantial majority of residential customers; (c) are being deployed to public telecommunications networks by telecommunications carriers; and (d) are consistent with the public interest, convenience and necessity.

ACCESS FOR PERSONS WITH DISABILITIES

225: In order to carry out the purpose established under section 1 … the Commission shall ensure that interstate and intrastate communications relay services are available, to the extent possible and in the most efficient manner, to hearing-impaired and speech-impaired individuals in the United States.
255: A provider of telecommunications service shall ensure that the service is accessible to and usable by individuals with disabilities, if readily

TITLE I:

For the purpose of regulating interstate and foreign commerce in communications by wire and radio so as to make available, so far as possible, to all people of the United States a rapid, efficient nationwide and world-wide wire and radio communications service with adequate facilities at reasonable charges, for the purposes of national defense, for the purpose of promoting safety of life and property through the use of wire and radio communications…

PUBLIC SAFETY

229: The Commission shall prescribe such rules as are necessary to implement the requirements of the Communications Assistance for Law enforcement Act… shall include rules to implement Section 105.... that require common carriers to require appropriate authorization to activate interception of communication or access to call-identifying information and to prevent any such interception or access without such authorization…The Commission shall review the policies and procedures.... and shall order a common carrier to modify any such policy or procedures that he Commission determines does not comply
Title III: It is the propose of this Act...to maintain control of the Unites States over all the channels of radio transmission… No person shall use or operate any apparatus for the transmission of energy or communications… except under and in accordance with this act and with a license in that behalf granted and under the provision of this Act.

INTERCONNECTION AND CARRIAGE

201: It shall be the duty of every common carrier… to establish physical connections with other carriers… through routes and charges… and provide facilities and regulations for operating such through routes… All charges, practices, classifications, and regulations for and in connection with such communications service shall be just and reasonable…
202: It shall be unlawful for any common carrier to make nay unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities or services for or in connection with like communications service, directly or indirectly.... or to make or give any undue or unreasonable preference…or to subject any particular person, class of persons or locality to any undue or unreasonable prejudice or disadvantage.
251: Interconnecting: (a) General Duty of Telecommunications Carriers – Each telecommunications carrier has the duty—(1) to interconnect directly or indirectly with the facilities and equipment of other telecommunications carriers; and (2) not to install network features, functions or capabilities that do not comply with the guidelines and standards established…

CONSUMER PROTECTION

258: No telecommunications carrier shall submit or execute a change in a subscriber's selection of a provider of telephone exchange services or telephone toll service except in accordance with such verification procedures as the Commission shall prescribe.

PRIVACY

222: Every telecommunication carrier has a duty to protect the confidentiality of proprietary information of, and relating to other telecommunications carriers... and customers

THE AMBIGUITY IN THE CLASSIFICATION OF HIGH SPEED DATA TRANSMISSION

The Commission

As shown in Table III-1, for almost two decades since the passage of the 1996 Act the legal classification High Speed Data Transmission and therefore the regulatory regime to which it is subject has been up in the air. The FCC under Democrat leadership for half a decade after the 1996 Act was unsure about how to classify High Speed Data Transition and conducted only a Notice of Inquiry.[28] Under Republican leadership, the Commission moved quickly in two rulemakings to classify High Speed Data Transmission as an information service.[29] For some purposes this located it outside of the traditional common carrier regulation that applies to telecommunications services, regulation that was spelled out in Title II of the Act. However, the Commission wrestled with the momentous implications of the information service classification in two ways that made it clear that things were still unsettled.

First, the FCC asserted that to the extent it needed to regulate High Speed Data Transmission for purposes of achieving the goals of the Communications Act, it could do so under a long standing theory that the broad authority to regulate communications under Title I of the Act could be used to regulate services that did not fall directly under Title II. In other words, Title I provided ancillary authority to pursue the goals of the Act. Since the Computer Inquiries that regulated data transmission services in the pre-1996 Act era had rested on ancillary authority for thirty years, the claim of ancillary authority seemed reasonable.

Second, the FCC recognized that choosing the information service classification had major implications for the achievement of the other goals of the Communications Act, particularly universal service. The FCC opened proceedings to gather information about how to address the impact of the information service classification on the other public service goals of the Act,[30] but it did not complete the investigations or adopt any policies before it adopted the information service classification.

Although the first two FCC information service classification orders moved ahead without addressing the universal service questions, the FCC that issued the Open Internet Order also took tentative steps to move universal service into the broadband age. Unlike the previous Commissions, the FCC issued and adopted proposed rules to actually deal with the challenge of universal service in the broadband era.[31] Not surprisingly, that effort is being challenged in the courts.[32] Moreover, there are open proceedings at the FCC that deal with universal service and other goals of the Act that have been identified as Title II goals implemented by common carrier regulation. It is safe to say that the effort to bring the universal service goal into the 21st century is just as up in the air as the Open Internet goal.

TABLE III- 1: COMPLEX AMBIGUITY IN THE CLASSIFICATION OF HIGH-SPEED DATA TRANSMISSION SERVICE

Year	Event	Implications for Current Classification Review
1998	Stevens Report	Ambiguous on Classification
1998	Public Interest Groups Petition for Title II Classification	Need for Nondiscrimination demonstrated
2000	*Portland v. AT&T Cable*: 9th Circuit Court of Appeals finds cable	Title II classification for cable modem service
2000	FTC imposes commercial access condition on AOL-Time Warner	Concern about bottleneck provider expressed
2002	FCC issues Cable Modem Declaratory Order classifying Cable modem service as an information (not telecommunications) service.	Classified Information Service; Title I Authority Asserted, Need to address Communications Act principles affirmed
2003	*Brand X v. FCC* – 9th Circuit Court of Appeals affirms its *Portland v. AT&T* and overturns Cable Modem order	Information Service rejected; telecommunications affirmed
2004	Chairman Powell declares Four Internet Freedoms	Importance of Nondiscrimination, Consumer protection
2005	FCC uses Title II authority to investigate undue discrimination by Madison River	Importance of Non-discrimination affirmed
2005	Supreme Court reverses 9th Circuit (6-3) on procedural grounds and upholds FCC information service classification	Information service upheld, Justices debate Title I authority
2005	FCC extends the Information service definition to mass market, high-speed data transmission services offered by telephone companies.	Title I authority claimed; Need to address Communications Act principles affirmed
2005	FCC turns Four Internet Freedoms into a policy statement	Importance of Non-discrimination, Consumer protection affirmed
2006	AT&T agrees to network neutrality Bell South merger condition	Ability to distinguish service demonstrated
2007	FCC finds Comcast illegally discriminated against peer-to-peer applications.	Need for non-discrimination affirmed, Technical ability to offer separate services demonstrated
2010	Open Internet Proceeding initiated	Need for Non-discrimination stated, Title I authority asserted
2010	National Broadband Plan	Importance of Communications Act principles affirmed Failure to achieve Communications Act goals documented
2010	D.C. Appeals Court overturns FCC action against Comcast	Title I authority questioned
2010	Broadband Internet Access Notice of Inquiry	Recognizes important of all Communications Act public service principles Documents failure to achieve goals of the Act.
2010	FCC issues Open Internet Order	Title I and s. 706 Authority to require transparency, prevent blocking and discrimination
2012	Universal Service Fund Order Challenge in 10th Circuit	Limitation on s. 254
2012	PSTN Docket	Implementation of public service principles in the Internet era debated
2014	D.C. Appeals Court vacates anti-blocking and discrimination rules	s. 706 authority upheld, rules vacated for imposing core common carrier rules on non-common carriers

The Courts

The Courts compounded the ambiguity. Appeals court decisions that said High Speed Data Transmission is a telecommunications service[33] were overturned by the Supreme Court on procedural grounds, not substantive grounds.[34] That is, the Supreme Court found that there was sufficient vagueness in the underlying statute to allow the agency to exercise the expert discretion to categorize High Speed Data Transmission as it saw fit. Since the Supreme Court did not reach the issue of substance or policy, i.e. how it should be classified, a significant amount of ambiguity remained.

With the information service classification upheld for High Speed Data Transmission, the FCC moved forward with rules and actions based on its assumption that it had Title I ancillary authority to regulate the service. The D.C. Appeals Court has twice rejected the claim to regulatory authority over an information service under the ancillary authority doctrine. However, as noted above, in the second D.C. Appeals Court case, somewhat surprisingly, the Court asserted very strongly that the FCC has authority under section 706 of the 1996 Act to regulate network management practices. The court suggested that the section 706 authority could be broadly construed, if the FCC finds that the deployment of broadband service is inadequate or unreasonable.

The result is surprising in part because the FCC downplayed 706 authority in the first network neutrality case (the Comcast BitTorrent appeal) and the D. C. Appeals Court agreed.[35] Therefore, the court went to great lengths in the Open Internet Order appeal to explain how the FCC was justified in changing its mind – i.e. to conclude that deployment was not reasonable, even though it had previously concluded that it was. It pointed out that the standard for showing that the regulatory commission's change of mind is reasonable had been lowered by the Supreme Court.

The court ruled that by finding the deployment of broadband facilities is not reasonable the FCC has the authority under section 706 to regulate High Speed Data Transmission. The Court accepted the FCC's finding of unreasonable deployment, but it rejected FCC's the remedy, ruling that the FCC could not use rules that were tantamount to core Title II common carrier type regulation. It gave the FCC the authority, but limited its power.

THE CURRENT LEGAL AMBIGUITY

Ancillary Authority Under the 1934 Act

Ancillary authority was a legal principle that evolved in regulatory practice and legal opinion to deal with a fundamental weakness in Communications law. The law is static, the industry is dynamic. As communications technology evolves, it presents the authorities who have the day-to-day responsibility for overseeing the industry with the challenge of figuring out how the technological developments affect the goals of the Act and where the technological developments fall under the Act, if the Commission concludes that the development threatened the goals. The Congress provided a very broad and evolutionary remit to the regulatory agency in the first paragraph of the Communications Act that could easily support this flexibility:

> For the purpose of regulating interstate and foreign commerce in communications by wire and radio so as to make available, so far as possible, to all people of the United States a rapid, efficient nationwide and world-wide wire and radio communications service with adequate facilities at reasonable charges, for the purposes of national defense, for the

> purpose of promoting safety of life and property through the use of wire and radio communications… [36]

A pragmatic approach to jurisprudence dictated by words like rapid, efficient, adequate and reasonable allowed flexibility in interpretation and implementation to ensure that the agency could pursue the broad goal with ancillary authority. The court set two primary constraints on the ancillary authority of the agency. It had to show that the ability of the agency to achieve the overall goal was being placed at risk by technological developments. It had to show that the authority it was using ancillary to the broad goals of Title I had a nexus to the tools the Congress had given the agency specifically in other titles the 1934 Act.

Flexibility in Title II

We should also note that Title II exhibited flexible and evolutionary processes itself. The key to the evolution is that the strong language about discrimination is qualified by the adjectives, "just," "reasonable," "undue," and "unreasonable."

> 201: It shall be the duty of every common carrier… to establish physical connections with other carriers… through routes and charges… and provide facilities and regulations for operating such through routes… All charges, practices, classifications, and regulations for and in connection with such communications service shall be just and reasonable…
> 202: It shall be unlawful for any common carrier to make any unjust or unreasonable discrimination in charges, practices, classifications, regulations, facilities or services for or in connection with like communications service, directly or indirectly.... or to make or give any undue or unreasonable preference…or to subject any particular person, class of persons or locality to any undue or unreasonable prejudice or disadvantage.[37]

Under the Communications Act, one can differentiate between services and classes of customers, without engaging in "unjust," "unreasonable" or "undue" discrimination, if the distinctions are carefully drawn, economically justified and applied in a manner that is fair. All members of a class must be treated similarly, but different classes of customers or categories of services can be treated differently. Moreover, defining what is "unjust," "unreasonable," or "unduly" discriminatory is itself an ambiguous undertaking under Title II. Several of the network management practices that are hotly contested in the wake of the Open Internet Order could be allowed under Title II. Not only were different categories of service common, but some customers could receive individual, private line services for special treatment. Business arrangements in which service providers paid the bills that customers normally would were also allowed. These practices evolved to accommodate dynamic change and diversity under a static act.

Regulatory Flexibility Under the 1996 Act

It can be argued that the amendments to the 1934 Act adopted by the 1996 Act dramatically altered the legal terrain of FCC authority with respect to "adequate facilities" in two important ways. It recognized the importance of flexibility, but adopted a different approach to providing it to the agency. Sections 706 and 254 give the agency the authority to evolve regulations to address the two key purposes identified in the first sentence of the 1934 Act.

- Section 706 directly addresses the issue of the reasonable and timely deployment of facilities (addressing the goal of adequacy).

- Section 254 directly addresses the availability of services at reasonable charges.

The language of Section 706 is targeted at advanced telecommunications services, which are defined broadly, and uses the key terms from the first sentence of the Act.

> SEC. 706. ADVANCED TELECOMMUNICATIONS INCENTIVES.
>
> (a) IN GENERAL- The Commission and each State commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms) by utilizing, in a manner consistent with the public interest, convenience, and necessity, price cap regulation, regulatory forbearance, measures that promote competition in the local telecommunications market, or other regulating methods that remove barriers to infrastructure investment.
>
> ADVANCED TELECOMMUNICATIONS CAPABILITY- The term 'advanced telecommunications capability' is defined, without regard to any transmission media or technology, as high-speed, switched, broadband telecommunications capability that enables users to originate and receive high-quality voice, data, graphics, and video telecommunications using any technology.

Section 254 includes traditional telecommunications services, advanced telecommunications service and information services, making it very broad.

> UNIVERSAL SERVICE PRINCIPLES- The Joint Board and the Commission shall base policies for the preservation and advancement of universal service on the following principles:
>
> (1) QUALITY AND RATES- Quality services should be available at just, reasonable, and affordable rates.
>
> (2) ACCESS TO ADVANCED SERVICES- Access to advanced telecommunications and information services should be provided in all regions of the Nation.
>
> (3) ACCESS IN RURAL AND HIGH COST AREAS- Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and information services, including interexchange services and advanced telecommunications and information services, that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas…
>
> IN GENERAL- Universal service is an evolving level of telecommunications services that the Commission shall establish periodically under this section, taking into account advances in telecommunications and information technologies and services.

Section 10 provides another source of flexibility. It allows the FCC to forbear from regulating under Title II, where regulation is no longer "necessary" in the public interest. While the new approach to flexibility in Sections 706 and 254 increase or extend FCC authority, Section 10 provides flexibility in the opposite direction, allowing the FCC to forbear from regulation if doing so does not jeopardize he goals of the Act or advances the goal of promoting competition. Carriers can ask for forbearance.

> [T]he Commission shall forbear from applying any regulation or any provision of this Act to a telecommunications carrier or telecommunications service, or class of telecommunications carriers or telecommunications services, in any or some of its or their geographic markets, if

the Commission determines that--

(1) enforcement of such regulation or provision is not necessary to ensure that the charges, practices, classifications, or regulations by, for, or in connection with that telecommunications carrier or telecommunications service are just and reasonable and are not unjustly or unreasonably discriminatory;

(2) enforcement of such regulation or provision is not necessary for the protection of consumers; and

(3) forbearance from applying such provision or regulation is consistent with the public interest.

(b) COMPETITIVE EFFECT TO BE WEIGHED- In making the determination under subsection (a)(3), the Commission shall consider whether forbearance from enforcing the provision or regulation will promote competitive market conditions, including the extent to which such forbearance will enhance competition among providers of telecommunications services. If the Commission determines that such forbearance will promote competition among providers of telecommunications services, that determination may be the basis for a Commission finding that forbearance is in the public interest.

(c) PETITION FOR FORBEARANCE- Any telecommunications carrier, or class of telecommunications carriers, may submit a petition to the Commission requesting that the Commission exercise the authority granted under this section with respect to that carrier or those carriers, or any service offered by that carrier or carriers.

It is noteworthy that two of the three source of flexibility are located outside of Title II, giving them broad applicability (much like ancillary authority). Section 706 addresses the entire Act. Section 10 is framed as an amendment to Title I, which applies to the telecommunications that are regulated under Title II. It is equally interesting to note that Section 254 explicitly reaches beyond Title II to sweep in advanced telecommunications and information services, which generally lie outside of Title II.

Agencies and courts tend to be cautious when faced with change. They generally prefer incremental steps and try to decide cases based on the narrowest grounds possible, avoiding sweeping approaches that can have unintended consequences. However, the legal process will drive toward change when major legislation has been enacted and there is no doubt that the reach and footing of Title I ancillary authority and Title II regulation have been significantly modified by the 1996 Act. It would be a mistake to behave as if they are unaffected.

The primary implication of this argument is that the legal ambiguity facing the Commission is even greater than before the recent D.C. Appeals Court ruling in several respects. First , even if one argues that the Congress laid out a new approach to flexibility for the purposes of "reasonable deployment" of broadband, that explicitly does not change the legal terrain of the other purposes of the Act.

Second, Congress took a different approach to universal service, so it is not directly covered in the 706 legal structure. However, the FCC could argue that it should fall under section 706, but it would be best to make that argument after it has used it full power and authority under section 254. If it invokes section 706 before it implements section 254, the court could easily argue it is not ripe.

Third, with respect to the other public service principle of the Act, consumer protection, public safety, consumers with disabilities, the 1996 Act did not create an alternative legal structure that would get in the way of ancillary authority.

The final aspect of complexity resides in the fact that the FCC could reclassify High Speed Data Transmission as a telecommunications service. It could conclude that the information service classification was in error, or that circumstances have changed to the such an extent that the information service classification is no longer appropriate. The path to "reclassification" is marked by two recent legal signposts that need to be carefully interpreted.

First, the D.C. Appeals court discussion of the conditions under which the Commission can change its mind might apply to reclassification, but it should be noted that section 706 (and section 254) directly invite a continuous reevaluation of the terrain, so the Commission does not have to explain why it is asking the questions in the first place. Reclassification requires the FCC to justify the entire exercise and will run into trouble if it invokes reasonable network deployment or universal service before it has explored the available alternatives

Second, the fact that the original decision was upheld under the theory of agency discretion means that it can use discretion to reverse the decision. However, flip flopping to expand the Commission's authority is likely to receive a very different reception than using its discretion to reduce its authority (and Justice Scalia's dissent that complained about the extreme discretion being granted to the Commission signals the danger).[38]

IV. PORTFOLIO ANALYSIS OF THE ELEMENTS OF THE NETWORK COMPACT

New law requires new practice and norms. The authority and power of the FCC under Sections 702, 254, and Section 10 will evolve under the 1996 Act, much as ancillary authority evolved under the 1934 Act. The complex ambiguity of the legal terrain means the Commission has choices and options and must chart a course that maximizes it ability to achieve the goals of the Act.

EVALUATING PROSPECTS OF SUCCESSFULLY ACHIEVING THE NETWORK COMPACT

Reviewing the history of these issues from the point of view of the Broadband Network Compact goals, we can identify a complex set of interrelated questions that must be answered to give the Commission maximum capability (legal power) to achieve the goals (see Table IV-1). The situation facing the Commission easily qualifies as one of complex ambiguity. It must win both authority and power by demonstrating why it needs to exercise authority over specific actors and how it will do so. It must make these showings for each of the purposes of the Act/elements of the Broadband Network Compact.

TABLE IV-1: COMPLEX AMBIGUITY IN THE ABILITY TO CREATE THE NETWORK COMPACT

Source of Authority	**Regulatory Reach (Effectiveness)**			**Prospect of Denial of Authority/Power**	
	Why	Who	How	Authority	Power
Title I ancillary	Accomplish general purposes of the Act	Information providers	Regulation has a nexus to Title II authority	Bleak (two losses) '96 Act may limit	Difficult (non-common carrier rule may apply)
Section 706	Inadequate or unreasonable deployment	Anyone	Anything that has a nexus to deployment finding, but is not core common carrier-like rule	Clear	Unclear (narrow non-common carrier rule)
Title II	Meets common Carrier definition	Common carrier	Title II regulations for which the Commission has not chosen to forbear	Difficult (change of mind)	Clear w/ authority '96 Act may limit
Section 254	Meets universal service definition	Telecom or Information service providers	Eligible Telecommunications Carrier (ETC) rules perhaps others	Unclear	Clear w/ authority

The choice of which authority to invoke requires an examination of three of the key constraints on authority – the need to justify its exercise, the scope of its reach in terms of who will be regulated, and the nature of the tools of regulation the Commission will have at its disposal. The court cases make it clear that those constraints deeply affect the ability to use the authority to achieve the goal. Table IV-1 evaluates four potential sources of authority to enable the FCC to achieve the goal of a Broadband Network Compact.

One should also consider the prospects of prevailing in the claims of authority and power. An approach that is attractive from the perspective of why, who and how to regulate, that has little chance of being upheld may be an inferior choice to one that is less attractive in terms of authority

and power, but has a much higher probability of being upheld. Portfolio analysis is based not only on the calculation of expected pay offs (probability of success x value of outcome), but more importantly on combining assets to achieve the maximum expected outcome from a portfolio of assets by balancing the level of risk and reward and the correlation between the risks.

Table IV-2 present my evaluation of the current lay of the land in terms of power and authority. Needless to say, the nooks and crannies of the new legal terrain are going to be explored in excruciating detail over the near future. My goal at this point is to map out the major features of the terrain so that the largest obstacles can be negotiated.

TABLE IV-2: THE NEW TERRAIN OF LEGAL AUTHORITY AND POWER UNDER THE 1996 ACT

		AUTHORITY		
		Weak	**Unclear**	**Strong**
POWER	**Weak**	**Ancillary Authority (Cabined by the 1996 Act)**		**706 Transparency (weak but could be stronger)**
	Unclear		**Title II with forbearance (Hard to get, has limitations)**	**706 Network Management (power undefined)**
	Strong			**254 Universal service (Yet to be decided, but Significant potential)**

BUILDING A PORTFOLIO OF REGULATORY ASSETS

Handicapping court rulings on authority and/or power in the current environment involves unknown unknowns. While pointing to that region of the terrain of knowledge got Secretary of Defense Rumsfeld in trouble, it aptly describes the fog of war and the current legal/judicial terrain of decision making the FCC confronts. While the decision maker should be attuned to the possibility of big positive surprises, the one thing that should be avoided is unnecessary exposure to catastrophic negative surprises.

> Simply put, don't get yourself in the Fourth Quadrant (Unknown/Unknowns)… the most obvious way to exit the Fourth quadrant is by "truncating," cutting certain exposures by purchasing insurance, when available… Avoid Optimization; learn to love redundancy… one can buy insurance, or construct it, to robustify a portfolio… Avoid prediction of small-probability pay offs.[39]

Figure IV-1 and Table IV-3 inserts my evaluation of the outcomes and prospects for each of the approaches to implementing policies to achieve the goals of the Act into the decision making framework. Figure IV-1 locates each of the major options with reward defined as the effectiveness of the power to implement the element of the network compact. Effectiveness is the ability of power that has been authorized to achieve the goal. Risk of failure is the likelihood of being upheld on both authority and power. I provide the primary cause of the location as defined by the negative rating (i.e. low effectiveness or high risk of failure). I identify the strategic action for each in bold. Each approach has a different value. Table IV-3 links the recommended action back to the strategic advice derived in the decision making analysis.

FIGURE IV-1: RISK/ REWARD LANDSCAPE OF OPEN INTERNET & UNIVERSAL SERVICE POLICY

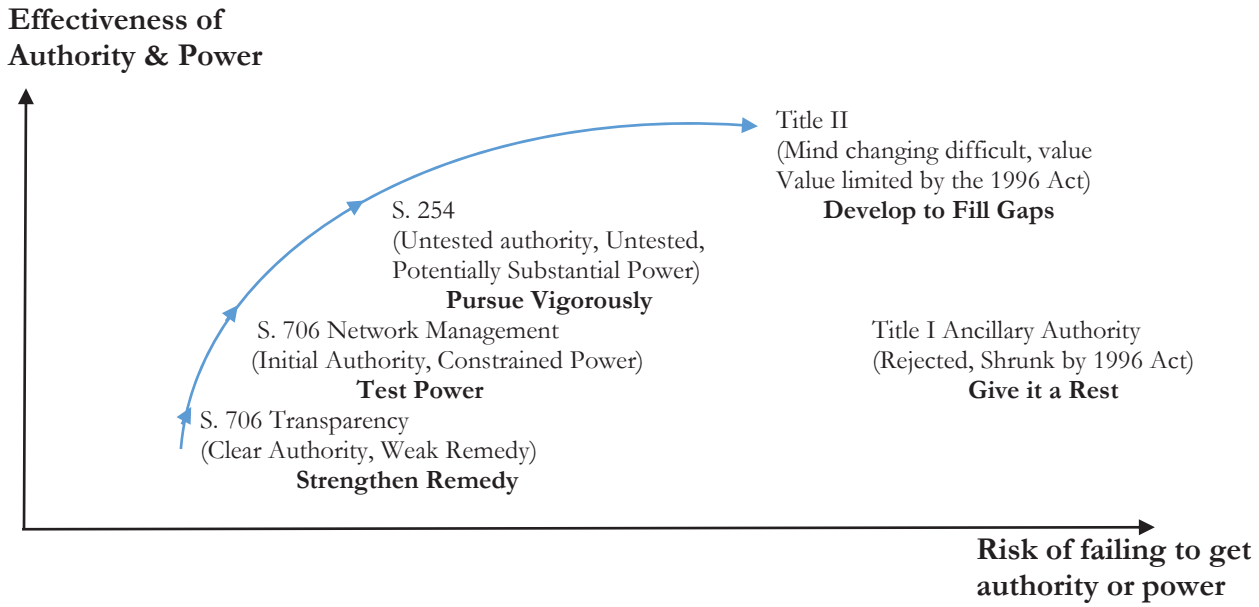


TABLE IV-3: STRATEGIC RESPONSE TO AMBIGUITY OF POWER AND AUTHORITY

	Legal Basis	Effectiveness of Authority	Effectiveness of Power	Strategy/Action	
Redundancy	Section 706 Transparency Network Management	High Moderate	Low Moderate	Strengthen remedy Test limits of power	New law needs to be explored
	Section 254 Universal Service	Potentially high but untested	Potentially high but untested	Vigorously pursue	
Low probability outcomes	Title I Ancillary Authority	Rejected by D.C. court	Shrunk by '96 Act	Give it a rest, examine potential for areas where '96 Act has not undercut	
	Title II	Requires mind changing	High, but limited by '96 Act	Develop for gaps in '96 Act	

Failure is potentially catastrophic

Consumer Protection
Consumers with Disabilities
Public Safety

This analysis indicates that the FCC needs a nuanced, multi-pronged strategy. Applying the principles of strategic decision making to the terrain of decision making on which the FCC finds itself, we conclude that the prudent strategy should include the following actions.

- The FCC should assert the independent authority and explore the powers it has under several of the key, new Sections of the '96 Act to create a robust portfolio of tools to pursue the core goals of the Communications Act

- Maximize the power of transparency under Section 706 to promote competition and provide consumer protection.
- Develop regulation of reasonable network management to the greatest extent possible under Section 706.
- Implement effective universal service mechanisms under Section 254.
- Explore Title II with forbearance (Section 10) for those goals of the Act that cannot be accomplished under the authorities and powers of sections 706 and 254, particularly for public safety, consumer protection and consumers with disabilities and privacy.

Efforts to develop the new tools in the Act have the highest probability of success because they are most likely to be seen as implementing the will of Congress as interpreted by the courts. Title I ancillary authority is now the least promising of the strategies for network neutrality. The basic conditions for an ancillary authority argument may still be strong, but the law has changed. The prospects for Title I ancillary authority have been dramatically reduced by two defeats at the Appeals Court level and the strong argument made for section 706 by the court. In this view, section 706 is an important part of a new approach Congress took to affording the FCC broad powers to develop tools to achieve the goals of the act. Congress gave a specific grant of authority to the Commission in the case where the most important goals (adequate facilities recast as reasonable and timely deployment) is not being achieved. The biggest mistake made in reclassification may have been the assumption that ancillary authority existed. Ancillary authority may fare better for the other goals of the Act that are not addressed by the new approach to flexibility.

The question of whether s. 254 provides an independent grant of authority to pursue policies that "make available to all Americana" both "advanced telecommunications and information services" is certainly worth pursuing with great vigor. It not only keeps options open, but advances the principle of building resilience through redundancy and diversity of authority and power. Given two decades of complex ambiguity in this space, it is a mistake to think that any one of these sources of power and authority is enough. It can be argued that universal service could comfortably reside under all three authorities and, given its importance in the Act, should. Title II classification affords access to the traditional common carrier powers, Section 254 affords the ability to address information services, and 706 provides a range of regulatory approaches not available under Title II or section 254.

Section 706 authority to impose transparency requirements has been upheld. While this is not seen as very effective, it certainly could play an important role. The first FCC action to enforce non-discrimination after the information service classification was initiated by a third party discovery of discriminatory behavior that was taken up by the mass media and evolved into an official complaint. The FCC's Open Internet Order includes measures to rapidly deal with complaints from the public. Crowd sourcing enforcement and mobilizing public opinion could have a significant impact on High Speed Data Transmission service providers.[40] The Commission could beef these processes up, demand rigorous transparency and encourage public involvement. Augmenting the transparency function creates diversity within the portfolio since it is a unique source of power.

Developing multiple sources of authority is a key strategy. It creates robustness. I locate section 706, section 254 closer to the efficient frontier because this is new authority that has yet to be developed. The limitation that the court placed on the power that can be exercised pursuant to

that 706 authority is unclear, however (a new source of ambiguity). The Court's reasoning that the FCC cannot use the regulatory authority conferred by s. 706 in any way that resembles common carriage is "new" law. The FCC can seek to overturn it on appeal, or explore what it means with a new order that attempts to implement it. The latter is a superior strategy; testing the limits of "new" law with concrete rules keeps the option open to appeal later, while seeking to secure as much power as possible. Moreover, the constraints placed on section 706 power for purposes of network management need not apply to section 254, since 254 has an independent basis of authority within Title II.

Given the experience since the passage of the 1996 Act, it is a mistake to claim that reclassifying high speed data transmission as a telecommunications service is easy or likely to succeed. Title II now involves not only a change of mind, but also a new classification of data transmission, which was never classified as a Title II telecommunications service. The fact that it is perceived as having a high value should not cloud the independent judgment of its prospects. Moreover, there is a distinct possibility that it would have less value than is generally assumed because of the past flexibility in Title II and the weakening of Title II by the 1996 Act.

Nevertheless, preserving the option of Title II can be an important strategic asset (threat). Energizing the Title II proceeding on the premise that the Commission is trying to achieve the goals of the Act under the court ruling as best as it can. Ultimately the Commission may have to invoke Title II selectively (with forbearance) or reverse the information service classification of high speed data transmission in order to effectively pursue the goals of the Act. This adds significantly to the policy portfolio. The argument will be easier to make after all the other avenues have been exhausted. It will also be more compelling to make these arguments when all of the Title II authorities and powers affected by the information service classification are in play.

Following this line of reasoning, the AT&T petition to address the transition from the 20th century, copper-based, electronic switched TDM network to the 21st century fiber-based Internet protocol switched network should be rolled into the Title II proceeding. This will make it clear that the FCC will not repeat the mistake of the Powell/Martin approach of giving up authority and power before proper provision to ensure the Commission's ability to pursue the goals of the Act had been made. To the extent carriers want relief from regulation sooner, they can use Section 10 to demonstrate specific rules are no longer necessary in the public interest.

One can pursue all four of the options that lie close to the efficient frontier simultaneously by conducting different proceedings on different schedules. The idea that the FCC would have split, even fragmented jurisdiction for different sections of the Act may seem odd, but that has always been a fact of life under the Act. Not only has the Congress given it different powers and authorities in different Titles, but the split basis for authority for network management was the situation for over thirty years under the Computer Inquiries, where Title I ancillary authority was used to regulate the data transmission services of Title II telecommunications carriers. Jurisdictional inconsistency is the rule, rather than the exception in the complex communications space.

CONCLUSION

It would be a luxury to hit the pause button and take time to reflect on these complex challenges, but the law does not allow it and the political process, reflected in instantaneous, critical caricatures, does not treat delay kindly. Decisions about appeal must be made quickly. Thus, one of

the most important direction setting decisions comes early. The Commission has chosen to explore the power it has under section 706, while continuing to develop the other regulatory approaches.

This approach recognizes the new terrain and adapts, keeps options open, seeks to quickly implement new rules and places only a specific set of assets at risk. It also heads in an important system building direction. Even if the commission successfully reclassified High Speed Data Transmission as a telecommunications service, Sections 706 and 254 would still be relevant. As the D.C. Appeals Court interpreted the 706 authority, it is a systemic tool that cuts across Titles to accomplish one of the primary goals of the Act. The plain language of Section 254 makes it a similar systemic tool. This is the "new" law that needs to be developed. Until the Commission tries to do so, the courts will likely keep sending it back to the drawing board.

Thus, the prospects for achieving the goal of writing a Broadband Network compact are enhanced by pursuing a balanced portfolio of redundant approaches with different authorities and powers. If the 1996 law were written differently, or the reclassification route (which is now over a decade ole) had not been taken, the terrain would have been different and the best strategy might for writing the Broadband Network Compact might be different. But, the Commission must navigate the terrain in which it finds itself, not in some alternative universe. The "all of the above" approach makes perfect sense for the FCC to pursue when confronting the complex ambiguity that has typified the terrain of communications policy since the passage of the 1996 Act.

In the editorial in which the New York Times opined on the decision to pursue section 706, it cautioned that "Having failed twice to write rules acceptable to the appeals court, the F.C.C.'s credibility is at stake. It has to prove that its latest strategy can work."[41] It went on to claim that "reclassifying broadband… is more likely to survive a court challenge than using the F.C.C.'s power to promote broadband." Whether one agrees with that interpretation or mine, I think we can agree that reclassification is very far from a certainty. Under the conditions of complex ambiguity, a strategies that "can work" involves a sequence of choices that preserve options and layer outcomes, rather than a simple binary choices. The "new" law changing the terrain of decision making that needs to be explored first is section 706 and section 254.

END NOTES

[1] The Editorial Board, The F.C.C. Tries Again, *New York Times,* February 22, 2014.

[2] United States Court of Appeals For The District Of Columbia Circuit, January 14, 2014, Verizon, Appellant V. Federal Communications Commission, Appellee, Independent Telephone &Telecommunications Alliance, Et Al., Intervenors, No. 11-1355, http://www.cadc.uscourts.gov/internet/opinions.nsf/3AF8B4D938CDEEA685257C6000532062/$file/11-1355-1474943.pdf

[3] Preserving the Open Internet, GN Docket No. 09-191, WC Docket No. 07-52, Report and Order, 25 FCC Rcd 17905 (2010) (Open Internet Order), aff'd in part, vacated and remanded in part sub nom. Verizon v. FCC, No. 11-1355 (D.C. Cir. Jan. 14, 2014).

4 Andrew Jay Schwartzman, *Did Congress Empower the FCC to Regulate the Internet? Appeals Court Says 'Yes,'* Benton Foundation, February 10, 2014, http://benton.org/node/174118

[5]Berin Szoka and Geoffrey Manne, The Feds Lost on Net Neutrality, But Won Control of the Internet, Wired, 01.16.14, http://www.wired.com/opinion/2014/01/one-talking-comes-net-neutrality/

[6]Free Press, N.D. "Net Neutrality: What You Need to Know Now," http://www.savetheinternet.com/net-neutrality-what-you-need-know-now

[7] Federal Communications Commission, In the Matter of The Open Internet Remand, GN Docket No. 14-28, February 19, 2014; Craig Aaron, *FCC Action Will Not Protect Free Speech Online,* Free Press, February 19, 2014;.

[8] In government, the term *authority* is often used interchangeably with *power*. However, their meanings differ: while *power* is defined as "the ability to influence somebody to do something that he/she would not have done", *authority* refers to a claim of legitimacy, the justification and right to exercise that power. http://en.wikipedia.org/wiki/Authority

[9] Since this paper is about change in the terrain of decision making, it is important to know when legal language was changed. Throughout this paper, when I refer to generic and enduring principles and language in the Communications Act, I use the term the "Communications Act." When I refer to specific parts of the Act that were amended, I refer to the date of its inclusion, i.e. either the 1934 Act or the 1996 Act.

[10] Verizon v. FCC, No. 11-1355, slip op. at 17, 63.

[11] Selected articles on the two issues addressed in this analysis include, Mark Cooper, "The Long History and Increasing Importance of Public Service Principles for 21st Century Public Digital Communications Networks," *Journal of Telecommunications and High Technology Law*, forthcoming; "Broadband in America: A Policy of Neglect is not Benign," in Enrico Ferro, Yogesh K. Dwivedi, J. Ramon Gil-Garcia, and Michael D. Williams, Eds., *Overcoming Digital Divides: Constructing an Equitable and Competitive Information Society,"* IGI Global Press, 2009; "The Importance of Open Networks in Sustaining the Digital Revolution," in Thomas M. Lenard and Randolph J. May (Eds.) *Net Neutrality or Net Neutering* (New York, Springer, 2006); "The Digital Divide Confronts the Telecommunications Act of 1996: Economic Reality versus Public Policy," in Benjamin M. Compaine (Ed.), *The Digital Divide: Facing a Crisis or Creating a Myth?* (Cambridge: MIT Press, 2001); "Inequality In The Digital Society: Why The Digital Divide Deserves All The Attention It Gets," *Cardozo Arts and Entertainment Law Journal*, 2002. "Open Access To The Broadband Internet: Technical And Economic Discrimination In Closed, Proprietary Networks," *University of Colorado Law Review,* Vol. 69, Fall 2000.

[12] I have developed this framework for the selection of resources to include in the portfolio of assets used to meet the need for electricity (Mark Cooper, *Least Cost Planning for 21st Century Electricity Supply: Meeting the Challenges of Complexity and Ambiguity in Decision Making,* MidAmerican Regulatory Utility Conference, Annual Conference, June 5, 2011; "Prudent Resource Acquisition in a Complex Decision Making Environment: Multidimensional Analysis Highlights the Superiority of Efficiency," *Current Approaches to Integrated Resource Planning, 2011 ACEEE National Conference on Energy Efficiency as a Resource,* Denver, September 26, 2011; "Multi-Criteria Portfolio Analysis of Electricity Resources: An Empirical Framework For Valuing Resource In An Increasingly Complex Decision Making Environment", *Expert Workshop: System Approach to Assessing the Value of Wind Energy to Society,* European Commission Joint Research Centre, Institute for Energy and Transport, Petten, The Netherlands, November 13-14, 2013.).

[13] The increase in complexity in the communications sector is described in the paper. The increase in complexity in the electricity sector can be summarized as follows. Resource acquisition in the electricity sector was a fairly simple undertaking up until a couple of decades ago. Growing concerns about climate change, volatility of fossil fuel prices, and cost escalation for nuclear reactor operation and construction, have made it a much more complex and ambiguous space. Since coal, gas and nuclear power account for 90% of the electricity generated in the U.S., the introduction of this complex ambiguity into resource acquisition represents a major change in an important decision making space that has triggered an intense search not only for new resources to keep the lights (and computers) on, but also for frameworks for making better decisions.

[14] The growth of digital communications transforms the decision making space in a fundamental way. The passive, homogeneous public that was satisfied with representative democratic institutions in the pre-digital age is replaced by multiple, heterogeneous publics that demand active participation in the democratic process. This carries the essential democratic aspiration – that people write the rules under which they live – to a higher level. See Mark Cooper, "Why Growing up is Hard to Do: The Quarterlife Crisis of the Digital Revolution," *Journal of Telecommunications and High Technology Law,* 2013, 11(1).

[15]Federal and state policy makers simultaneously relaxed regulation in these two industries in the mid-1990s (Mark Cooper, "Delivering the Information Age Now," Telecom Infrastructure: 1993, *Telecommunications Reports,* 1993; "Protecting the Public Interest in the Transition to Competition in Network Industries," *The Electric Utility Industry in Transition* (Public Utilities Reports, Inc. & the New York State Energy Research and Development Authority, 1994); "Recognizing the Limits of Markets, Rediscovering Public Interest in Utilities," in Robert E. Willett (ed), *Electric and Natural Gas Business: Understanding It! (2003 and Beyond*) (Houston: Financial Communications: 2003).

[16] Technology Risk Management Analysis used the word incertitude to describe the overall challenge and ambiguity to describe what I call vagueness. I use the term vagueness to describe a specific region of knowledge and ambiguity to describe the overall challenge of lack of knowledge. While the distinction between risk and (Knightian) uncertainty has been clearly recognized for almost a century (Chen, Yu-Fu Michael Funke and Nicole Glanemann, 2011, *Dark Clouds or Silver Linings? Knightian Uncertainty and Climate Change,* CES IFO Working Paper, No. 3516, July), the distinction between ambiguity and vagueness is less clear (Stirling, Andrew, 1994, *Diversity and Ignorance in Electricity Supply Investment, Energy Policy*, March, 1999, *On Science and Precaution in the Management of Technological Risk,* European Science and Technology Observatory, May; 2000, *On the Economics and Analysis of Diversity*, University of Sussex, SPRU, Paper No. 28, 2006, "Analysis, Participation and Power," *Land Use Policy,* 2007, *Risk, Precaution and Science: Towards a More constructive Policy Debate,* EMBO Reports, 8, 2007, "A General Framework for Analyzing Diversity in Science," *Technology and Society, Interface, Journal of the Royal Society*, 4) used fuzzy logic as the analytic tool in this sector, and the wikipedia uses fuzzy logics to elaborate on the definition of vagueness. Ambiguity is a term used in writing and math, and under conditions where information can be understood or interpreted in more than one way and is distinct from vagueness, which is a statement about the lack of precision contained or available in the information. Context may play a role in resolving ambiguity. For example the same piece of information may be ambiguous in one context and unambiguous in another. The term vagueness denotes a property of concepts (especially predicates). A concept is vague. if the concept's extension is unclear; if there are objects which one cannot say with certainty whether they belong to a group of objects which are identified with this concept or which exhibit characteristics that have this predicate (so-called "border-line cases"); In everyday speech, vagueness is an inevitable, often even desired effect of language usage. However, in most specialized texts (e.g., legal documents) vagueness is distracting and should be avoided whenever possible. Fuzzy logic One theoretical approach is that of fuzzy logic, developed by American mathematician Lotfi Zadeh. Fuzzy logic proposes a gradual transition between "perfect falsity", for example, the statement "Bill Clinton is bald", to "perfect truth", for, say, "Patrick Stewart is bald". In ordinary logics, there are only two truth-values: "true" and "false". The fuzzy perspective differs by introducing an infinite number of truth-values along a spectrum between perfect truth and perfect falsity. Perfect truth may be represented by "1", and perfect falsity by "0". Borderline cases are thought of as having a "truth-value" anywhere between 0 and 1 (for example, 0.6).

[17] There are much older systems of thought that identify the dilemmas of complex ambiguity. For example, the technology risk assessment literature draws analogies to Greek mythology. These risk types, named after metaphors from Greek mythology, are comprised by the following characterization of risks: **Damocles:** high catastrophic potential, probabilities (widely) known; Cyclops: no reliable estimate for probabilities, high catastrophic potential; **Pythia:** causal connection confirmed, damage potential and probabilities unknown. **Pandora:** causal connection unclear, high persistency and ubiquity; **Cassandra**: intolerable risk of high probability and great damage, but long delay between causal stimulus and negative effect; **Medusa:** large potential for social mobilization without clear scientific evidence for serious harm. **Damocles and Cyclops: risk-based**. These risks can be handled and managed adequately by strategies and regulations based on the two main risk characteristics: extent of damage and probability of occurrence. That is particularly so with the Damocles class, since here the probabilities are well known. With the Cyclops class, precautionary measures are more appropriate, since here the probabilities are not well defined. **Pythia and Pandora: precautionary**. These risks are characterized by a high degree of uncertainty as to probability of occurrence and extent of damage, hence a "just in case" approach may be justified. **Cassandra and Medusa: discursive**. These risks are characterized by either a delay effect, where the dangers initially may not be known or perhaps are even ignored, or risks where presumably harmless effects are perceived as threats by certain portions of the public or pressure groups. These risks require knowledge-building strategies to raise awareness and confidence. Klinke Andreas, Renn Ortwin, research blogging, risk analysis, risk management, risk society http://www.husdal.com/2010/10/11/a-new-way-of-classifying-and-managing-risks/Renn, A. Klinke, O. (2001).

Precautionary principle and discursive strategies: classifying and managing risks *Journal of Risk Research, 4* (2), 159-173 DOI: 10.1080/136698701750128105

Analogies can also be made to religion. In the theology of the Catholic Church, **Limbo** (Latin *limbus*, edge or boundary, referring to the "edge" of Hell) is a speculative idea about the afterlife condition of those who die in original sin without being assigned to the Hell of the damned. Limbo is not an official doctrine of the Roman Catholic Church or any other. Medieval theologians described the underworld ("hell", "hades", "infernum") as divided into four distinct parts: hell of the damned (which some call Gehenna), Purgatory, limbo of the fathers, and limbo of infants. "Limbo of the Patriarchs" or "Limbo of the Fathers" (Latin *limbus patrum*) is seen as the temporary state of those who, in spite of the personal sins they may have committed, died in the friendship of God, but could not enter Heaven until redemption by Jesus Christ made it possible. http://en.wikipedia.org/wiki/Limbo. **Purgatory** is the condition or process of purification or temporary punishment [1] in which, it is believed, the souls of those who die in a state of grace are made ready for Heaven. http://en.wikipedia.org/wiki/Purgatory.

In many religions, **Heaven** is a realm, either physical or transcendental in which people who have died continue to exist in an afterlife. Heaven is often described as the holiest place, accessible by people according to various standards of divinity, goodness, piety, faith or other virtues…. Many religions state that those who do not go to **heaven** will go to another place, hell, which is eternal in religions such as Christianity. Some religions believe that other afterlives exist in addition to heaven and hell, such as purgatory, though many hells, such as Naraka, serve as purgatories themselves. Some belief systems contain universalism, the belief that everyone will go to heaven eventually, no matter what they have done or believed on earth. Some forms of Christianity, and other religions believe hell to be the termination of the soul. http://en.wikipedia.org/wiki/Heaven In many religious traditions, **Hell** is a place of suffering and punishment in the afterlife. Religions with a linear divine history often depict Hell as endless. Typically these traditions locate Hell under the Earth's external surface and often include entrances to Hell from the land of the living. Other afterlife destinations include Heaven, Purgatory, Paradise, Naraka, and Limbo. http://en.wikipedia.org/wiki/Hell, Ignorance in the space of the unknown is not bliss; it is hell for decision makers. Decision makers are better off in Limbo than hell because in this space, characterized by vagueness, they can analyze contingencies and build in monitoring devices that adjust system performance. They are better off in purgatory than hell because, in this space characterized by uncertainty, they can analyze scenarios and buy real options delaying important decisions until the uncertainty is, hopefully, reduced. Unfortunately, there is no heaven on earth for decision makers dealing with electricity resource decisions; the best decision makers can hope for in the land of the living is to face risk, against which they can hedge.

[18] See note 10 above.

[19] Stirling, 1994, Of all the many strategies developed to deal with incertitude, only one has been elevated to the status of a figure of speech... only fools put all their eggs in one basket. The potency of this cliché is evident in many fields, where diversification is felt to be a major strategic response to incertitude. In the energy policy literature, references to the need to diversify reliance on different options are ubiquitous. Stirling, 2010, pp. 1622-1623, Attention tends to focus on what are held to be relatively well-known sources of disruption, like fuel-price fluctuations, constraints on the availability of specific primary resources or a restricted number of clearly identified threats. However, to focus exclusively on these relatively readily characterized parameters in some ways circumscribes the real value of diversification. As distinct from a range of more specific and targeted preventive and mitigating strategies, diversity remains effective (at least in part) even if the source or modalities of the prospective disruptions are effectively unknown. By maintaining an evenly balanced variety of mutually disparate options, we may hope to resist impacts on any subset of these, even if we do not know in advance what these impacts might be.

[20] Taleb, *Black Swan,* 2010, pp. 317-373.

[21] Costello, Ken, 2005, Making the Most of Alternative Generation Technologies: A Perspective on Fuel Diversity, NRRI, March.

[22] Blyth, William, et al., 2007, Investment Risk under Uncertain Climate Change Policy, *Energy Policy, 35, p. 5268*8.

[23] Black Swan theory argues the following. "Our modern, complex, and increasingly recursive world… means that the world in which we live has an increasing number of feedback loops, causing events to be the cause of more events, thus generating snowballs and arbitrary unpredictable planet-wide winner-take all effects. We live in an environment where information flows too rapidly, accelerating epidemics. Likewise event can happen *because* they are not supposed to happen (Taleb, Nassim Nicholas, 2008, "The Fourth Quadrant: A Map of the Limits of Statistics," Edge: The Third culture, p.xxii)" A related second characteristic of the modern world that increases the importance of rare events is their viral nature which results in scalability – the tendency for impacts to spread widely. "Those who start, for some reason getting some attention can quickly reach more minds than others and displace the competitors, (Taleb,2008, 30) fads will be more acute, so will runs on banks… a very strange virus spreading throughout the planet." (Taleb, 2008, 317, see also (Taleb, Nassim 2007, The Black Swan, New York: Random House Taleb, Nassim 2010, The Black Swan (New York: Random House)

[24] http://en.wikipedia.org/wiki/Prudent_man_rule, The **Prudent Man Rule** is based on common law… The prudent man rule directs trustees "to observe how men of prudence, discretion and intelligence manage their own affairs, not in regard to speculation, but in regard to the permanent disposition of their funds, considering the probable income, as well as the probable safety of the capital to be invested…" The modern interpretation of the "Prudent Man Rule" goes beyond the assessment of each asset individually to include the concept of due diligence and diversification… The logic is this: an asset may be too risky to put all your money in (thus failing the Prudent Man Rule) but may still be very diversifying and therefore beneficial in a small proportion of the total portfolio.

[25]January 9, 2014, Speech at the Computer History Museum, citing the earl speech at the Ohio State University, December 2, 2013.

[26] Statement on Court Opinion on Open Internet Rules, January 14, 2014.

[27] Statement By FCC Chairman Tom Wheeler On The FCC's Open Internet Rules, February 19, 2014

[28] Federal Communications Commission, Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities, GN Docket No. 00-185.

[29] Federal Communication Commission, Declaratory Ruling and Notice of Proposed Rulemaking, 17 FCC Rcd 4798, 2002, (Cable Modem Order); Report and Order and Notice of Proposed Rulemaking, 20 FCC Rcd 14853, 2005, Wireline broadband Order).

[30] Cable Modem Service Declaratory Ruling and NPRM Gen Docket 00-185, CS Docket No. 02-52CS Docket No. 02-52, Declaratory Ruling (2002); Federal Communications Commission, Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, CC Docket No. 02-33, et al., Report and Order and Notice of Proposed Rulemaking (2005).

[31] Federal Communications Commission, In the Matter of Connect America Fund A National Broadband Plan for Our Future Establishing Just and Reasonable Rates for Local Exchange Carriers High-Cost Universal Service Support Developing an Unified Intercarrier Compensation Regime Federal-State Joint Board on Universal Service Lifeline and Link-Up Universal Service Reform – Mobility Fund, WC Docket No. 10-90, GN Docket No. 09-5, WC Docket No. 07-135, WC Docket No. 05-337l, CC Docket No. 01-92, CC Docket No. 96-45, WC Docket No. 03-109, WT Docket No. 10-208, November 18, 2011. The carriers pressed their side of the transition to broadband by seeking to reduce their public interest obligations, In the Matter Of Technological Transition of the Nation's Communications Infrastructure, GN Docket No. 12-353.

[32] In The United States Court Of Appeals For The Tenth Circuit, No. 11-9900,

[33] AT&T Corp. v. City of Portland, 216, F.3d 877 (9th Cir. 2000); National Cable & Telecommunications Ass'n v. Brand X Internet Services, S. Ct. 2688 (2005).

[34] National Cable & Telecommunications Ass'n v. Brand X Internet Services, S. Ct. 2688 (2005).

[35] Comcast Corp. v. FCC, 600 F.3d 642, United States Court of Appeals, District of Columbia Circuit, Apr. 6, 2010.

[36] 47 U.S.C. § 151 (1996).

[37] 47 U.S.C. §§ 201, 202 (1996).

[38] National Cable & Telecommunications Ass'n v. Brand X Internet Services, S. Ct. 2688 (2005).

[39] Taleb, *Black Swan,* 2010, pp. 317-373.

[40] Mark Cooper, "Why Growing Up is Hard to Do: Institutional Challenges for Internet Governance in the "Quarter Life Crisis of the Digital Revolution," *Journal on Telecommunications and High Technology Law,* 2013. 11(1).

[41] The Editorial Board, The F.C.C. Tries Again, New York Times, February 22, 2014