
MONITOR GROUP MEMO

To: The FCC NBP Team

From: The Monitor Group

Date: Thursday, February 11, 2010

Re: Identifying Uncertainties for the National Broadband Plan

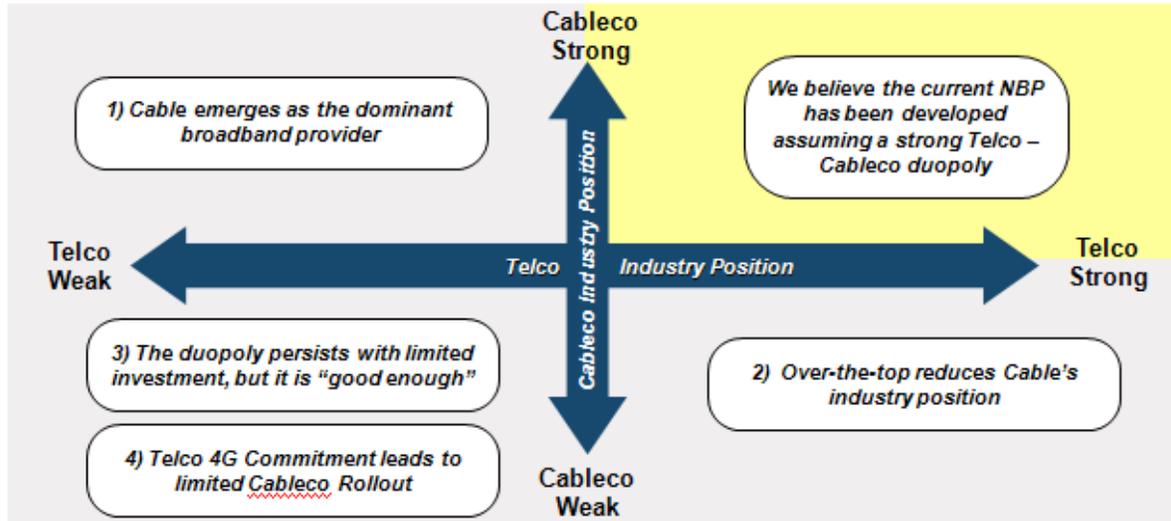
Context

Based upon our expertise on scenario planning and uncertainty development, and ongoing conversations with the FCC and others, Monitor is providing our perspective on, and identify key uncertainties for the National Broadband Plan (NBP), to be reported to Congress in March 2010. In addition to reviewing FCC documents, press information, and other commentary, the Monitor team spoke with David Isenberg on 01/12/10 to discuss the FCC's existing plans of broadband in the United States. In this document we identify a number of critical areas of uncertainty and potential scenarios that may broaden the scope of the NBP, and provide additional perspectives on the implications of these uncertainties.

Scenarios & Implications for the NBP

We have developed five scenarios for the future of the broadband industry, three of which address evolution of existing competition, while two envision new competition:

Possible Scenarios for the Future Broadband Industry Structure



Scenarios in which new entrants gain power:

- 5) The Telco "pivot to mobile" fails, and competitors emerge utilizing new wireless technology
- 6) A Major Internet company gains power over the infrastructure

1. Cable emerges as the dominant broadband provider

Telcos fail to respond competitively to Cableco DOCSIS 3 rollout, while Cablecos move aggressively to offer very strong triple play bundles. Telcos find themselves unable to compete with cable on broadband speeds, except for the limited (18 million) fiber households (mostly Verizon FIOS) and experience a rapid loss of landline customers. This sudden Telco weakness curtails investments in landline infrastructure capable of competing with DOCSIS 3. A series of divestitures and acquisitions leaves Cableco the dominant supplier of landline broadband connections. This results in Cablecos feeling little competitive pressure to upgrade beyond DOCSIS 3 without additional impetus.

The U.S. infrastructure fails to rise to the level required for healthcare, education, etc., while other nations continue their advance. The U.S. broadband landscape fragments into three archetypes. Regions where fiber to the home exists become small islands of competition with high speeds at relatively low prices. However, the majority of the remaining 97 million households will receive high speed broadband, but at substantially higher prices charged by the Cableco. Cableco has little incentive to invest in more

costly to reach rural areas, and Telco has little ability, leaving rural America to rely upon low-speed DSL.

Implications:

- The NBP should identify ways to stimulate additional competition between Cable and Telco. One way to do this would be via depreciation rules based on relative functionality that would (e.g.) tend to devalue comparatively obsolete DSL plant.
- The NBP should consider the feasibility of advocating legislation prohibiting Cablecos from acquiring Telcos. The NBP should recommend that the FCC exercise caution in considering such acquisitions.

2. Over the Top TV-over-IP kills the incumbent video entertainment subscription model, rendering broadband providers to manage “dumb pipes”

Rapid advances in Internet video (better quality, new devices, access to a very wide variety of content) spur a rapid shift in consumer preferences towards models for delivery of entertainment that replace the incumbent Cable model. Advances in video compression reduce the importance of broadband speed; basic DSL and wireless speeds suffice. Mobility and accessibility trumps quality. Web-based video, RSS, and other Internet video models trump both broadcast and proprietary video-on-demand. Market power shifts to Hulu, AppleTV, Google (via YouTube 2.0), and a new cadre of emerging innovative video platforms. The newly empowered Over the Top players accelerate their deal making with content owners. Hulu and Apple also begin to offer their own subscriptions to premium and new content, but at significantly reduced prices compared to Cable. Customers abandon their monthly subscriptions to Cableco and Telco video packages.

This weakens both Telco and Cableco sectors, but because video is a bigger revenue stream for Cablecos, their growth suffers more. Paradoxically, the Cableco upgrade to broadband speeds of DOCSIS 3 hastens the erosion of the video subscription model. In addition, to the increased power of content providers reduces pricing power of broadband providers. The result is a weakened Cable sector, and a Telco sector that can, indeed, compete with cable in video entertainment without major investments in network upgrades. However, this slows investment in landline network infrastructure that the nation needs for education, healthcare and other advanced communications needs.

Implications:

- NBP should incorporate a contingency plan to help Cablecos complete their Docsis 3 rollout, if revenue weakness threatens to curtail these plans.
- The NBP should consider the feasibility of advocating legislation prohibiting Telcos from acquiring Cablecos. The NBP should recommend that the FCC exercise caution in considering such acquisitions.

3. The duopoly persists with limited investment, broadband is “good enough” but growth is slow and “trailing-edge.”

Given the continuing recession and limited access to capital, neither Cablecos nor Telcos commit to make significant investment in infrastructure. As a result, no new competing technology is deployed, and the Cableco and Telco duopoly remains comfortably static, without driving significant advances.

However, Americans are able to make do with lower speed broadband, and come to see it as “good enough”. The focus of computing is increasingly mobile with lower bandwidth requirements, and compressed video. The highest value innovations are low bit rate applications (viz. Twitter, texting). Carriers see the highest returns on infrastructure investments at the very lowest-end. Supporting this, we know that carriers offering leading-edge speeds (e.g., 50 mbit downloads) are seeing unexpectedly low willingness to pay.

One result might be that investment decisions are driven by the idea that high-speed networks have already exceeded speeds that yield high rates of return. The risk of such thinking is the de-funding of private U.S. broadband investment, which could bring a self-fulfilling absence of high-speed application deployment.

A broader result might be that U.S. technology and media companies face a harder time competing internationally, as Asian and European companies that operate in high bandwidth environments gain share in international markets. Meanwhile China continues to develop its own Internet and technology companies, and expands its economic influence in the technology sector more broadly. As we approach 2020, a global standards battle ensues both in technology, as well as infrastructure.

Implications:

- The NBP should consider a contingency plan to subsidize wireline broadband deployment to achieve full rollout to be put into operation if the U.S. broadband landline infrastructure continues to fall behind the rest of the world..

4. Telco 4G Commitment leads to limited Cableco Rollout

As wireless devices with downstream and upstream media distribution capabilities, such as Apple’s iPad, continue to proliferate there is an increased consumer demand for bandwidth demanding application. Telcos shift their investment focus to 4G wireless (LTE) infrastructure to attempt to provide greater broadband coverage with a moderate amount of investment. Cablecos continue to focus on upgrading their cable network to DOCSIS 3, but its coverage is bound to urban areas or limited rural areas where they already have strong presence or are mandated to provide cable services. Cablecos do not invest in rollout in most rural states due to high operating expenses and lower ARPU. These two divergent

moves provide extensive coverage of wireless access, but result in a gap in the speed of connectivity between urban and rural customers.

Online content industry evolves much faster than network providers expected. As video content providers such as Apple, YouTube and Hulu become dominant players to a range of mobile and fixed internet devices, bandwidth requirements increase. In addition Digital Health services, as well as increased networking of embedded devices (in autos and the home) drive up bandwidth requirements.

The result for consumers is a bifurcated market. There are urban pockets where FiOS and high speed cable have been installed. However, in a broader “middle ground” 4G internet (LTE) provided by Telco providers fall short of broadband needs. Meanwhile rural customers are further left behind by the limited options, such as DSL, available to them.

Implications of Scenarios 1-4, above, with general goal of increasing competition:

- The NBP needs to stimulate development of alternative technologies and encourage investment in emerging technologies, including wireless, advanced DSL and fiber to the home with the aim of spurring effective competition.
- The FCC should act to increase available spectrum and to stimulate technologies that use spectrum more efficiently to expand mobile competition and fixed-mobile substitution.
- The NBP should advocate removal of barriers to entry for “third pipe” providers, e.g., through advocacy of a Community Broadband Act.

5. The Telco "pivot to mobile" fails, but new competitors emerge utilizing new wireless technologies & spectrum.

Telcos such as AT&T expect to become mobile telephone companies, relying on mobile revenues as landline revenues decline. However, the current price war with Cableco accelerates.

Meanwhile, a cadre of new wireless broadband competitors appears using newly available spectrum and new ways to use existing spectrum. Some of these new mobile players skillfully exploit new devices and Internet capabilities to become major players. The nation's investment in mobile infrastructure grows rapidly, but a corresponding investment in landline infrastructure fails to materialize because both sides of the landline duopoly are weakened by the new, unexpectedly competitive wireless landscape.

The result for customers is moderately fast broadband at substantially reduced prices. These reduced broadband speeds are acceptable, while low prices and a wide array of new mobile devices spur new customers and new uses. The risk here is that at least one side of the landline duopoly is weakened, with correspondingly weak development of very high

speed applications that the nation needs for education, healthcare and other advanced communications.

Implications:

- National Interest goals continue to be well served via high speed Internet access, and the NBP should focus on fostering competition and infrastructure investment from wireless technologies in addition to wired technologies.

6. A major Internet company gains power over the infrastructure

Using acquisitions, partnerships and an open access model, a major Internet company (e.g., Google) aggressively begins to supply wired and wireless broadband directly to end customers and businesses. The goal is to make that company the primary launch point from all Internet interactions. For example, assuming that Google is such a company, Google launches YouTube 2.0 to provide a broad array of video content to end customers. Google builds upon its existing infrastructure investments by acquiring spectrum. Google brings a new ad supported business model to infrastructure, enabling it to undercut the pricing of Cablecos and Telcos leading to a rapid gain in market share.

In the past, we have seen major shifts in the structure of other established industries caused by the introduction of an application (e.g., Napster) or a device (e.g., iPhone). Thus it is plausible that if a conflict were to arise between a major Internet company or device provider and one of the major Telco, Cableco or mobile service providers. This shift in industry structure could change the entire model for investing in network infrastructure.

The result for end customers would be lower priced broadband access.

Implications:

- The NBP should incorporate plans to support broadband plans of players outside of Telcos and Cablecos. Major Internet and application/content distribution companies, such as Google and Apple are prime candidates.
- Policies deriving from the NBP must be flexible enough to adapt to a new industry structure where outside players becomes dominant. It was unclear 5 years ago that Apple would be in its current dominant position in music or mobile telephony. Focusing on promoting broadband development via cable companies and telcos / MSOs may inhibit adoption of a new and better technology.
- In addition, the NBP should incorporate contingency plans for the consequences of such substantial changes in industry structure upon national broadband capabilities.

Additional Considerations

We have identified a couple of additional considerations that may be important for the NBP:

1. *Demand for bandwidth may be greater than, or in a different form than planned for.*

Demand for broadband is expected to increase steadily as new devices and applications drive consumers' need for faster and more accessible connections. The demand increase projected by the NBP may be underestimated due to a number of factors:

- **Increased demand for upstream bandwidth:** Increased reliance on peer-to-peer networks and user-generated content could drive demand for upstream bandwidth, requiring the realignment of upstream vs. downstream bandwidth requirements. Video sharing from PCs and from mobile devices could drive this. The number of texts sent daily by 12 year olds can be up in the hundreds, how many videos will they send?
- **New devices and applications driving demand:** Demand for broadband access could increase with the development and use of new, content-rich applications and more powerful devices. (3D TVs appeared at CES this year; some of these require up to 70 mbit/s.) Furthermore, as component performance improves and device prices fall, powerful devices will become more ubiquitous, shifting the role of device from edge of the value chain to the center.
- **The “Internet of Devices” drives demand:** With connectivity being embedded into a range of devices (TV, fridge, washer, vehicle, energy grid), machines could contribute significantly to the growth in Internet traffic.
- **Increase in telecommuting and home workers:** Americans are increasingly working from home and telecommuting. High-end teleconferencing systems will support this, but will require substantial two-way bandwidth.

There are many historical examples of infrastructure investment underestimating demand. AT&T is currently suffering from underestimating the volume of bandwidth requirements from iPhones.

Implications:

- Set bandwidth requirements in the NBP to exceed projected demand.
 - Calibrate bandwidth requirements in the NBP to meet the increased upstream requirements
2. *Demographic shifts, including the increasing population of Hispanic and other non-Caucasian groups, leads to different usage patterns and needs*

Hispanic, Asian and black populations represent a growing percentage of Americans, with Hispanics expected to be the largest cultural group by 2050. As the range of cultures represented in the U.S. increases, so will the range of usage patterns of bandwidth, Internet and media. Some groups may rely more heavily on mobile phones, while others may have higher usage of bandwidth in the home. The same may be true for applications; there is evidence suggesting that Facebook and MySpace attract substantially different demographic groups.

New entrants to the labor force are increasingly non-white and non-native English speakers. Reaching out to under-represented segments of the population will be critical.

3. Generational differences in patterns of use are accelerating, with cohorts

60 year olds use email. 35 year olds are on Facebook and LinkedIn. 20 year olds use Twitter and ForeSquare. 14 year olds send hundreds of texts a day. As technological improvement accelerates and new methods of communication are introduced on a rapid development cycle, significant generational differences will become more fine-grained and relevant technological age cohorts will narrow. This fragmentation of usage patterns will impact the bandwidth needs.

Implications of #2 and #3:

- Given the Plan's charger to include "all Americans," it will be important to understand the usage patterns of needs of different groups, how they are evolving, and how large a portion of the population that these groups represent.
- Developing plans to promote a range of broadband technologies and devices, wired and wireless, would ensure that the needs of a diverse groups are addressed.

4. Political change could lead to a very different agenda

We could envision a number of different agendas that may affect the industry structure:

- The government could be seen to take a more limited role in regulating the industry. Would this strengthen the leading Cablecos and Telcos? If so, would they compete and invest more in infrastructure, or would they focus more on extracting greater economic rents from their existing infrastructure, leading to increased prices?
- Given the rapid increase in deficits the government may slash budgets, leaving the FCC and/or the NBP with a reduced capability to impact the industry, leading to a similar set of questions above.
- The government may believe that broadband investment is critical to economic development and may be open do direct investment. Would this lead Cablecos and Telcos to reduce investment? Would this lead to reduced innovation?

5. *The consequences of a major disruption of the Internet, despite the low probability of such an event, makes it essential to develop plans to increase the robustness of the network.*

A major disruption of Internet functioning would lead to a major security, economic and health threat to the nation. Unfortunately, there are a number of plausible events that could lead to such disruptions:

- **Cyber-attack:** With the openness of existing network standards, one could easily envision Russia, China or a criminal organization unleashing a cyber-attack that brings down critical parts of the nation's infrastructure. Precursors to this can be seen by Russia's purported attacks on Estonia and Georgia, as well as the recent attacks on Google originating in China.
- **Disaster:** The tragedies befalling New Orleans and Haiti clearly demonstrate the increased loss of life and economic damage that can result from the loss of regional communications infrastructure. Many of the U.S.'s population and economic centers are at risk of experiencing a major hurricane, earthquake or other disaster. More broadly a pandemic could affect multiple population centers.
- **Vandalism:** A recent outage due to vandalism in Santa Clara County in 2009 reveals vulnerability of the network to a multi-point, coordinated vandalism attack.

Implications:

- Improving the robustness of the network infrastructure, would require a combination of new technological development, standards setting and the application of policy. A plan should be created that would coordinate the private and public sector to drive this development.
- Coordination with FEMA to develop plans to ensure network uptime, recovery and access in a time of disaster is essential to reduce the health and economic impacts of a disaster.
- Utilizing existing and emergent technologies to develop early warning systems, and a broad communication platform to coordinate the population, would reduce health risks.

Reflecting on the set of scenarios suggests the need for a high degree of flexibility and adaptability in the plan. Both supply and demand for broadband will be shaped by a number of forces whose interaction can create a wide variety of outcomes. These forces include industry structure, competition, technology, consumer behavior and political and economic conditions. The recommendations of the plan, therefore, should include thoughts on how the planning process can be carried forward to facilitate the on going adaption that will inevitably be needed.