

UP IN THE AIR:

**COMPETITION AND FEDERAL POLICY
AFFECTING
WIRELESS BROADBAND COMMUNICATIONS TECHNOLOGY**

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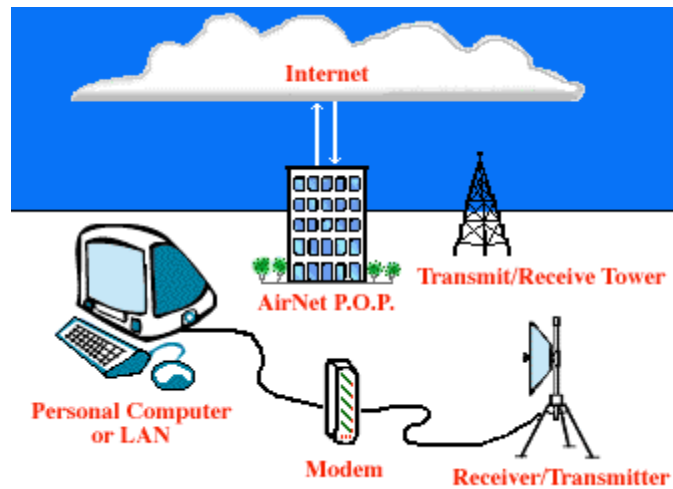
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INTRODUCTION

This paper analyzes wireless broadband communications and discusses how to level the playing field for this emerging technology. Wireless broadband engineers should be interested in a level playing field since the products they are developing are fueling the debate. The paper will define the issue, give a brief background, identify key players and conflicts, evaluate policy alternatives and give recommendations.

ISSUE DEFINITION

Several different technologies are vying to connect customers in the escalating broadband communications marketplace. It is not clear at this point which technology will dominate, however there remains the question of whether regulators treat each technology fairly.

Broadband communication is a generic term for fast data transmission (above 128 kilobits per second), which allows high-speed Internet connections, video conferencing and other speed dependent applications. The wireless communications industry expands at a phenomenal rate. The Telecommunications Industry Association expects wireless broadband expenditures to grow from \$6 million in 1998 to \$2.1 billion by 2002.¹ This relates directly to the increase in demand for faster Internet connections.

Wireless Broadband Communications Technology (WBCT) companies and consumers are interested in a level competitive playing field in relation to other technologies. If other technologies have advantages due to regulations or monopolistic business practices, then wireless broadband will be less able to compete.

¹Public Policy Report and Agenda, 1999, Telecommunications Industry Association.

BACKGROUND

WBCT TODAY

WBCT developers have overcome obstacles that have stood in WBCTs way to becoming a competitor in the broadband marketplace; antennas have become smaller, high frequency integrated circuits are more easily and reliably built and environmental challenges due to propagating signals through the air have been solved.

Two earth based WBCTs include Multichannel Multipoint Distribution Service (MMDS) and Local Multipoint Distribution Service (LMDS).

Technology	Frequency	Bandwidth	Data Rate	Range
MMDS	2.4 GHz	170 MHz	10 Mbps	60 km
LMDS	30 GHz	1.1 GHz	750 Mbps	3.5 km

Table 1 Summary of different WBCTs

MMDS is designed to serve a wide area with one antenna and is in use presently for Internet transmission. The Federal Communications Commission (FCC) auctioned the MMDS spectrum in 1996. It was originally intended for wireless cable.

LMDS will cover smaller contiguous areas with overlapping “cells.” LMDS is in a more experimental stage, but the FCC auctioned LMDS spectrum in 1998 for all basic trading areas (BTAs) in the United States. A BTA is a geographical partition roughly following county lines. LMDS license holders are required to provide service within ten

years.

Since the range of LMDS systems is shorter than MMDS, LMDS will require many more antennas. This could be a cost problem for smaller providers.² The significant advantage of LMDS spectrum over MMDS is the amount of bandwidth allocated, allowing much higher data rates.

Companies using other radio spectrum bands are also beginning to offer wireless broadband. Personal Communications Service (PCS) spectrum will connect mobile users.

Regarding the new fixed WBCTs, Professor Kavehrad³ at the Pennsylvania State University, an expert in the field, said that WBCT works great. He also mentioned that there are WBCTs in the R&D phase right now.

Satellite based systems will also compete for broadband users. Hughes Network Systems is a major player in satellite based WBCT and is rolling out a high-speed bandwidth-on-demand system based on geo-synchronous orbits as early as 2002.⁴ They claim to uplink at rates up to 6 Mbps.

Teledesic is using low earth orbiting satellites to build a global satellite network scheduled to go online in 2004.⁵ This network will also provide bandwidth-on-demand and a guaranteed quality of service between users.

² Cook, Bob Telephone Interview, President of CVairnet in Logan UT, June 9, 1999.

³Kavehrad, Moshen. Telephone Interview, Electrical Engineering Professor at the Pennsylvania State University, June 10, 1999.

⁴ Wireless Broadband on Demand, <http://www.hns.com/spaceway/spaceway.htm>, July 14, 1999.

⁵ Fast Facts, <http://www.teledesic.com/overview/fastfact.html>, July 10, 1999

The other big competitor in the satellite arena is Loral Orion, which is currently operating a worldwide data network. It has recently formed a partnership with an Internet Service Provider (ISP) to serve its online customers.

SPECTRUM MANAGEMENT

WBCT transmits data through the radio spectrum. This is equivalent to the coaxial cables of the cable industry, however radio spectrum is much scarcer; useable bandwidth is finite and shared by a variety of communications users. Government regulation and allocation of the radio spectrum resource play major roles in the competitiveness of WBCT.

Through the years the FCC used a lengthy process involving hearings and review to allocate mutually exclusive commercial spectrum. Licenses are mutually exclusive when more than one entity requests operation in the same area at the same frequency.

Broadcasters wanted faster access to spectrum so in 1982 Congress authorized a license lottery. This led to a huge number of applicants, lottery scandals, and an enormous amount of paperwork.⁶ As a result of these problems the FCC discontinued lottery spectrum distribution. In 1997 the FCC lost the power to conduct lotteries.⁷

In 1993 Congress allowed the FCC to use a competitive bidding (auction) process to allocate radio spectrum and the first auction was held in 1994.⁸ This has had its own problems, for example, the PCS C-Block auction earned \$10.1 billion but bankrupted many small businesses because they bid too much. There have also been instances of

⁶ CRS report "Spectrum Auctions and Management of the Electromagnetic Spectrum" IP 508S, June 1999.

⁷ Section 300 2(a)(5) of Pub. L. 105-33

⁸ Omnibus Budget Reconciliation Act of 1993 (P.L. 103-66)

collusion where businesses used nonstandard bids to communicate.⁹ Companies have generally accepted auctions as the quickest way to distribute spectrum licenses.

Special provisions in most auctions give bidding credits to small businesses by allowing them to pay a percentage less than their total bid. In most auctions this has been around 35%. To prevent unjust enrichment, any large company that buys a license from a small company bidder within a certain amount of time must pay the full amount.

Spectrum licenses also contain build-out requirements, which means a licensee has a certain amount of time to meet development expectations or forfeiture of the license will occur. This blocks companies from warehousing licenses to prevent use by competitors. Build-out requirements benefit the public by constraining licensees to extend service to consumers, but may be detrimental to innovation if the requirements are inflexible.

The most recent auctions have not made as much revenue as in the past. In 1996, an auction of 30 MHz of cellular telephone spectrum netted \$18 billion. Last year 1,100 MHz of spectrum allocated for LMDS only made \$577 million. One reason for the low bids may be that LMDS was an untried technology and investors were skeptical. Another reason is that Congress had an overly optimistic revenue forecast.

In the future the FCC plans to auction the 39 GHz spectrum for terrestrial fixed WBCT. The auction rules will differ from the LMDS auction, where telephone and cable companies were excluded from bidding.¹⁰ For the 39 GHz spectrum there will be no

⁹ Bass, G. "Electromagnetic Spectrum Auction: An economic Analysis of the C-block Auctions." CRS Report RL30119.

¹⁰ FCC ADOPTS SERVICE AND AUCTION RULES FOR LMDS (CC Docket 92-297)

restrictions on bidder eligibility and the licenses will have more flexible build-out requirements.¹¹

The regulatory issues affecting the 39 GHz spectrum will set the precedent of future wireless broadband allocations. The FCC believes that allowing less restrictive use of new spectrum promotes innovation and competition. The FCC says,

Given the fact that the 39 GHz service is still in its early stages of development, we believe that it is imperative that we not take any regulatory actions that would hamper the service's continued development and growth potential.¹²

WIRELINE BROADBAND COMPETITORS

Regional Bell Operating Companies (RBOCs) are notoriously sluggish at implementing new technologies. Prompted by competition from the cable industry, RBOCs have created Digital Subscriber Line (DSL) technology, which uses regular copper lines to deliver up to 8 Mbps. Customers complain RBOCs are not implementing DSL fast enough. Users are turning to other broadband technologies competing with DSL.

Another broadband competitor is the cable modem. This device uses coaxial cable lines to transmit digital data to homes and businesses. It can support data rates comparable to DSL.

AT&T is becoming the dominant player in the cable marketplace. The regulatory treatment of AT&T will be the precedent for the treatment of future wireless broadband providers. Like cable, WBCT inherently provides facilities based competition, which means it depends on the deployment of capital, not the use of existing infrastructure.

¹¹Second Report and Order FCC 97-391, ET Docket No. 95-183, PP Docket No. 93-253, October 24, 1997

AT&T owns or has stakes in most cable companies who are deploying cable modems. AT&T is unwilling to unbundle their services, i.e. AT&T will not let other ISPs use its cable to access customers.

Fiber optics also competes in the broadband marketplace. Fiber is definitely the technology of choice for backbone data networks, but loses its competitiveness in the local access market. Costs are prohibitive to connect small businesses and residential users.¹³ This leaves the competition for the “last mile” solution open to other broadband technologies.

TELECOMMUNICATIONS ACT OF 1996

The Telecommunications Act of 1996 (Telecom Act) was primarily aimed at deregulating the telephone industry, but it also has implications for WBCT. After Congress passed the Telecom Act, the massive deregulation of the telecommunications industry has allowed the entrance of wireless competitors. Before the Telecom Act was passed, they would have been illegal. However, the Telecom Act was drafted before WBCT became a participant in the broadband marketplace.

According to the Telecom Act, Regional Bell Operating Companies (RBOCs) are not allowed into the long distance data transfer and telephone business until they have met a checklist showing that they have opened up the local market. This is significant because though the exact predictions vary, most agree that within a few years, data traffic

¹² Second Report and Order FCC 97-391

¹³ In one example several fiber optic lines run in front of condominiums, but the cost to connect to any one of the cables is about \$50,000.

will far surpass voice traffic on networks. The RBOC's are clamoring to get into the data market before they meet the Telecom Act's checklist.

THE MARKET

William Kennard, chairman of the FCC, said, "I believe that the technical advances unleashed by [the telecommunications industries] are what is fueling our current economic boom – the longest peacetime expansion of our economy in history."¹⁴

In contrast, Alan Greenspan testified before the Joint Economic Committee that "the rate of growth of productivity cannot increase indefinitely."¹⁵

A company named Metricom currently has a wireless modem, the Ricochet, for mobile WBCT applications. Metricom plans to build a network across the United States in the next five years.¹⁶ Other companies including Teligent, Nextlink, and Winstar are deploying fixed and mobile wireless broadband communications networks nationwide.

THE PARTICIPANTS

CONGRESS

Congress passed the Telecommunications Act of 1996 (Telecom Act), which opened the telecommunications marketplace to competition. However, many aspects of the Telecom Act have been bogged down in litigation, and some argue over the effectiveness of the legislation.¹⁷

¹⁴ <http://www.fcc.gov/Speeches/Kennard/Statements/stwek933.html> May 26, 1999

¹⁵ Greenspan, A., Testimony Before the Joint Economic Committee United States Congress, June 14, 1999.

¹⁶ http://www.metricom.com/about/presltr_990520.htm May 20, 1999

¹⁷ "The Telecom Puzzle: Is there Enough Competition in the Telecom Industry?" p. 7 Congressional Quarterly, May 8, 1999.

Recently the Senate and House of Representatives held hearings to gain more information about the broadband competition question.¹⁸ Among the witnesses were WBCT industry representatives. They argue that the playing field must be leveled in order for competition to flourish, but they cannot agree on the rules.

On June 29, 1999 Senator Stevens of the Commerce Committee introduced the Competitive Access to Federal Buildings Act (S. 1301). Some states have already implemented legislation requiring public building owners to provide non-discriminatory access to all telecommunications carriers. Senator Stevens' law would like to follow the States' lead and open most federally owned buildings to competition.

THE FEDERAL COMMUNICATIONS COMMISSION

The Communications Act of 1934 expanded the Federal Radio Commission (FRC) to regulate both wireless and wireline communications and changed its name to the Federal Communications Commission (FCC). The FCC was charged with regulating communication impartially.¹⁹

The FCC today is reshaping itself to reflect the changes in the telecommunications marketplace, which has evolved from a monopolistic to a competitive environment due to actions taken by Congress.

¹⁸ Senate Judiciary Committee Hearing, July 14, 1999. House Commerce Committee hearing June 24, 1999.

¹⁹ Section 1 of the Communications Act of 1934 allows the FCC to "make available, so far as possible, to all the people of the United States, without discrimination on the basis of race, color, religion, national origin, or sex, a rapid, efficient, Nationwide, and world-wide wire and radio communication service with adequate facilities at reasonable charges...."

The FCC has proposed five goals that will be used as criteria to shape itself and the telecommunications industry. It is essential to analyze how the goals of the FCC will affect WBCT.

The FCC's goals promise to:

- Promote Competition.
- Minimize Regulations.
- Protect Consumers.
- Foster Innovation.
- Provide Universal Access.²⁰

The FCC looks to past policy decisions and their effects, to determine its future rules and regulations. We may assume from the overall goals of the FCC that it would like the WBCT industry to follow the precedent of success set in the mobile telephone market. The FCC is very proud of its deregulation of the wireless phone industry, and its subsequent explosion of growth. The FCC quickly points to this success when defending its deregulatory positions.

ASSOCIATIONS

In 1994 the Institute of Electrical and Electronic Engineers – United States Activities (IEEE-USA) issued a position statement foreseeing wireless broadband availability. IEEE-USA also supports spectrum auctions under certain criteria: that there are mutually exclusive applicants, and that the awarding of the licenses is in the interest of the public.

The Telecommunications Industry Association (TIA) supports spectrum auctions under certain conditions and urges the FCC to assure WBCT operators fair access to

²⁰ "A New Federal Communications Commission for the 21st Century" FCC internal document.

multi-tenant buildings.²¹ The TIA believes its suggestions for wireless competitiveness can be implemented without new legislation.

The Wireless Communications Association (WCA) International supports spectrum auctions and non-discriminatory access to rooftops and internal building wiring. The WCA has members ranging from wireless engineers to wireless broadband communications companies. They represent exclusively the fixed wireless community.

The Building Owners and Managers Association (BOMA) supports the FCC's inquiries into non-discriminatory building access and feels that telecommunications competition benefits tenants, but does not want building owners to be left holding the bill. BOMA does not support mandated access.²²

WBCT DEVELOPERS AND VENDORS

If there is a lack of competition and innovation due to unfair rules then there will be less demand for wireless products. WBCT developers and vendors, such as Nortel Networks, are interested in a level playing field for the WBCT industry so their products can be developed and sold in a competitive marketplace.

WBCT SERVICE PROVIDERS

WBCT service providers are especially interested in having access to customers. It has been estimated that 27% of households are in a multi-tenant environment. WBCT service providers argue that if building owners are allowed to discriminate between broadband technologies accessing tenants, be they residents or businesses, then

²¹ Competition Benchmark, <http://www.tiaonline.org/government/benchmarks/index.html>, June 13, 1999.

²² Telecommunications – Forced Building Entry, <http://www.boma.org/force.htm>, July 30, 1999.

competition will be unfair. For example, if building owners do not allow rooftop access to wireless companies, then other technologies will have an unfair advantage.

RESIDENTIAL CONSUMERS

Consumers Union takes the position that monopolies tend to raise prices and in competitive markets rates are much lower. They also state that incumbent broadband companies that have market power as a result of their facilities should not discriminate against independent vendors who must rely on those incumbents' transmission facilities to offer services.²³

KEY CONFLICTS AND CONCERNS

TERRESTRIAL BROADBAND VS. SATELLITE

A major competitor to land-based wireless broadband systems is the satellite telecommunications industry. They not only compete for the same customers but also for the same spectrum. The FCC will soon auction the 39 GHz spectrum for terrestrial fixed WBCT, which is in conflict with satellite use. Satellite operators argue that earth-to-orbit spectrum is used internationally and shouldn't be auctioned country by country starting in the U.S. Satellite broadband operators wouldn't have the resources to bid on all licenses necessary for satellite communications. Satellite operators will put up a stronger fight as more bandwidth is allocated to land-based wireless broadband uses.

²³ Kimmelman, G., Statement before the Senate Judiciary Committee on "Broadband: Competition and Consumer Choice in High-Speed Internet Services and Technologies" July 15, 1999.

BROADBAND PROVIDERS VS. BUILDING OWNERS

In order to compete with wireline telecommunications, WBCT must have access to business and resident premises. There are presently no Federal regulations ensuring nondiscriminatory access to buildings.²⁴ This means that building owners are free to make agreements differently between different data providers and technologies.

Mandating building access may have constitutional implications. In a recent report, the FCC examined the regulatory issue of mandating building access. The commissioners noted that wireless service providers purport that building owners have, in some cases, obstructed them from access to customers.²⁵ Gerry Lederer, vice president of governmental and industry affairs at BOMA, said that there have been no instances of discrimination against telecommunications providers. He also said that mandating access to buildings is unconstitutional.²⁶ Susan Ness, FCC commissioner, issued a statement cautioning that the FCC may not have the precedent to regulate building owners, and also questioned the constitutionality of such regulations.²⁷

Providers may also leverage building owners into agreements by promising low rates to tenants. Winstar recently is targeting customers with free long distance service for the first year, but the agreement requires signing up for three years of service.²⁸ Teligent promises a 30% discount with similar long-term commitments.

²⁴ FCC Report, CC Docket No. 98-146, http://www.fcc.gov/Bureaus/Common_Carrier/Reports/fcc99005.txt, Feb 2, 1999.

²⁵ Ibid.

²⁶ Lederer, G., Telephone Interview, July 29, 1999.

²⁷ Ness, S., Separate Statement in reply to FCC Report, Docket No. 98-146.

²⁸ Winstar Brochure, "Free Long Distance," July 26, 1999.

CONSUMER PROTECTION

Consumers Union believes that competition is vital to keep rates down and states, “strict antitrust enforcement, careful regulation, and legislation to correct flaws in the 1996 Telecommunications Act are needed to open the door to broad-based competition.”²⁹

UNIVERSAL ACCESS

Part of the FCC’s authorization directs them to see that everyone, so far as possible should have access to communications services. Presently trenching costs are prohibitive to implement wireline services to low-density population areas. WBCT is a viable solution to the communications need of these areas.

POLICY ALTERNATIVES

Regulators and policy makers must consider a list of criteria when considering policies to make the playing field level for wireless broadband. The playing field is the broadband marketplace filled with business and residential customers. Making the playing field level refers to allowing fair competition for Wireless Broadband Communications Technology (WBCT).

CRITERIA FOR EVALUATING POLICY ALTERNATIVES

Effectiveness

- Will the policy increase WBCT’s potential to have a larger broadband market share?
- Will the policy reduce the risk of a monopolistic marketplace?
- Will the policy foster innovation?

²⁹ Kimmelman, G., Ibid.

Efficiency

- Will the policy affect WBCT competitiveness in the long or short run?
- Will the policy cost a lot to implement?
- Does the Policy lessen or create more regulation?

Equity

- Will WBCT benefit unfairly at the expense of other technologies?
- Who will bear the burden of implementing the policy?
- How will the policy benefit consumers of different social and economic standing?
- Does the policy promote universal access to broadband?

Flexibility

- Is the policy applied generally, or on a case-by-case basis?
- Can the policy adjust with changing technology?

Feasibility

- Who will support / oppose the policy?
- Does the policy follow / digress from existing policies?
- Must Congress enact the policy, or can the FCC implement it under its current authority?
- Does the policy harmonize with current social and market conditions?

ALTERNATIVES AND EVALUATION

- 1. The FCC should allocate through competitive bidding more bandwidth to allow multiple fixed WBCT operators to compete in the same geographical area. The FCC should alter the auction rules to: remove spectrum bidding credits for small businesses, remove bidder eligibility restrictions and allow more flexible build-out requirements for licensees.**

Effectiveness: Allocating new radio spectrum to fixed broadband wireless providers will allow more competition to incumbent wireline and wireless technologies.

Dropping the bidder eligibility requirements will let incumbents purchase licenses and develop them with their sometimes-superior resources. Past auctions excluded incumbents so there will still be competition.

Efficiency: Auctioning more spectrum for broadband use will not cost a lot because the system to do so is already in place. Those who value the spectrum the most will bid the highest for the license. Also, the FCC will raise revenue for the government.

The policy will generate competition if developers create and implement viable technology for the auctioned spectrum, which leaves open the question of how fast the policy will create competition.

Equity: In previous auctions bidding credits have helped small to medium sized businesses have a comparative advantage against large corporations. Removing the credits would take away this advantage and smaller companies would bid in less valuable market areas.

Removing bidder eligibility requirements would let incumbent broadband companies enter the WBCT market. The FCC has not allowed incumbents to bid in previous auctions in order to provide competition in local monopolistic telecommunications markets. However it seems fair to allow incumbents a chance at new spectrum and allow them to compete. Incumbents armed with new spectrum would have

the means to connect rural and other hard to reach areas.

Flexibility: Flexible build-out requirements for new radio spectrum would effectively allow licensees to use their spectrum in innovative ways. Flexibility may make the FCC's enforcement of build-out requirements difficult because the FCC must subjectively enforce the rules, for example, instead of specifying how many communications units licensees must deploy, the requirements may generally ask for a degree of operation.

Feasibility: Satellite based operators oppose allocating more spectrum to fixed wireless broadband, which may make it difficult to implement the policy.

The FCC currently possesses the authority to auction spectrum and determine its use. Therefore the policy would not need new legislation to create it, but Congress may need to prompt the FCC to implement the spectrum auctions.

- 2. Congress should reorganize the FCC such that all commercial spectrum management is consolidated into one office and other offices are set up to oversee minimal regulatory issues. The FCC will also be charged with protecting, informing and providing universal access to consumers.**

Effectiveness: This Policy would effectively deregulate the telecommunications marketplace by reducing the regulatory body. This would increase competition in the

wireless broadband marketplace by removing regulatory roadblocks. However, monopolistic behavior such as network closure and discriminatory building access may evolve under deregulation and weaken wireless broadband competition.

Efficiency: By reducing the size of the FCC, Congress would eliminate redundancies. Consolidating spectrum management would allow speedier frequency allocations and efficient resolution of spectrum disputes. The FCC could more quickly address technology convergence in a consolidated environment.

Flexibility: This policy may prove to be too flexible in that there will be minimal rules governing the broadband marketplace. Monopolies may form undeterred by the FCC or Congress and WBCT would be stalled from local competition.

Feasibility: It is very difficult to induce drastic change to a bureaucracy. The FCC may defend its positions and try to rebut legislative progress by Congress. Change of this magnitude must be made by a significant amount of legislation. It is difficult to get anything through Congress without a major watering down taking place.

- 3. Congress should direct the FCC to require data networks to interconnect seamlessly and reasonably. As different competitors deploy data networks to solve the “last mile” problem, there are no rules regarding how they should interconnect. It is in the interest of wireless broadband networks, which are**

inherently overlaid on other networks, to be able to connect seamlessly to incumbents.

Effectiveness: This policy would allow small wireless companies to compete; otherwise they would need the capitol to create their own end-to-end networks.

Forcing data networks to interconnect would reduce monopolistic behavior because anyone could get into the broadband service market in innovative ways, including wireless providers.

Efficiency: This policy may create more regulation than is necessary. Data networks are already interconnecting under normal market forces. Over regulating a market has a tendency to slow technological advancement and innovation.

Wireless networks may not need to interconnect because their air links could bypass wireline to the Internet backbone. Thus the policy may not efficiently help wireless providers.

Equity: Those with existing networks and market advantage will oppose the policy because they stand to lose market share.

Flexibility: This policy is very rigid because it must specifically spell out the rules for interconnection. The policy would have to be derived from today's technology, which may become obsolete in a short while. A good example of this is the advent of the

cable modem bringing up the debate as to whether the cable industry should be regulated like RBOCs.

Feasibility: Current social and market conditions tend to favor an open market and oppose the policy. The FCC is also taking a hands-off approach in dealing with data networks. This would make it hard to create regulation enforcing interconnection.

- 4. Congress should direct the FCC to implement equality rules requiring building owners and managers to provide wireless broadband operators fair and reasonable access to customers. Every broadband technology sees multiple tenant environments as huge potential revenue. Without access to customers, wireless service providers can't compete.**

Effectiveness: The policy will only be effective if there is some kind of incentive or disincentive for building owners. For example, there could be a punitive fine to act as a disincentive for building owners to practice discriminatory behavior. This policy will also be effective because consumers have the potential to benefit from competition.

Efficiency: The efficient implementation of the policy will depend on how the FCC is directed to enforce the law. The task may prove to be very difficult, every building will be different and circumstances will vary. The task of deciding cases may prove to be very time and resource consuming.

Equity: All broadband technologies will compete on a fair basis for customers. This may be unfair to a technology that has a clear advantage over the others, for instance if its facilities are already in place in the building.

Consumers would benefit from the rules at perhaps the expense of building owners; however, companies wishing to connect new customers should pay the installation bills. Residents should be able to choose whom their broadband provider will be without having to move to a location that provides it.

Flexibility: Since Congress will probably direct the FCC to take a more passive role it will be up to the individual companies to make sure it works. Therefore flexibility would be ensured by letting broadband service providers take their cases to the FCC.

Feasibility: Building owners may create opposition to the legislation, but most broadband providers agree that something needs to be done to gain fair access. Consumer groups also support competitive access to lower rates for tenants.

Since the FCC has not regulated building owners in the past, it will probably require an act of Congress to allow the FCC to regulate these persons, but there may be constitutionality concerns with forcing access to private property.

RECOMMENDATIONS

Broadband communications is becoming paramount as a social and market tool in America. There is a race among the different broadband technologies to connect as many customers as possible. Most Congressmen agree that market competition should provide the means to bring broadband to consumers. Electrical engineers developing wireless broadband products must consider present and future legislation shaping the marketplace since they are creating the fuel for the debate.

The policy alternatives range from sweeping to specific. The most effective policies will make WBCT more competitive with minimal regulations. Data networks will interconnect on their own accord, hence regulations enforcing this will only add barriers to expansion. The FCC is in the process of redesigning itself, but analyzing how this should be done is a very difficult process.

The best alternative to leveling the competitive playing field for WBCT is a combination of allocating more spectrum to fixed wireless operators and mandating non-discriminatory access to rooftops and internal wiring of buildings. It is pointless to assign more broadband spectrum if operators cannot compete in a non-discriminatory marketplace.

CONCLUSION

- The FCC should continue to allocate spectrum through auctions for broadband communications with the following rules:
 - Remove small business bidding credits.
 - Remove bidder eligibility requirements.
 - Allow more lenient build-out requirements.
- Non-discriminatory building access legislation must place the burden of installation, upkeep and removal of telecommunications equipment on WBCT providers.