The Hidden Costs of Broadband

Franchises, Internet Access, Litigation and Industry Change

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Abstract

This paper presents one of the most significant costs of implementing a broadband service but at the same time one of the least analyzed component in that process, franchising. Simply stated, for a town as small as a few thousand households, the time it take to obtain a franchise under the best of circumstances is often well in excess of one year and the amount of labor includes often two or more people dedicated to that effort plus other costs such as legal, engineering and other costs. If the incumbent decides to fight, the process may take longer. The municipalities always want to increase their returns so the process becomes an escalation of demands and delays. For towns of say 2,000 households, as the author demonstrates by specific case studies, costs of $400,000 to $500,000 are not unrealistic. This means readily an additional cost of $250 per HH or at 25% penetration, $1,000 per HH. In contrast the capital required to deliver broadband in such a community is $1,500 per HH. Thus the franchise costs are approaching the capital costs per HH in many communities. This clearly becomes a dramatic if hidden element but also becomes a real but avoidable barrier to entry for any and all new broadband entrants. This paper details these costs and others and makes suggestions to remedy them.

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1. INTRODUCTION

Broadband has been touted as necessary for everything from national competitiveness to national defense. In addition other countries have clearly surpassed the United States in the deployment of broadband. There are clearly many reasons for the slow growth of broadband but one which has received little direct attention is the issue of a franchise. Unlike all other countries, the franchise in the United States is a highly complex and local process.

There are over 35,000 cities and towns in the United States, and each has a separate franchise requirement. In almost all of these cases the franchise must be negotiated and awarded prior to any form of construction. This can mean before any work is commenced even on pre-construction efforts. The franchise itself is a document which allows the operating entity to use the rights of way for the purpose of providing a video programming offering. This simply means providing an offering similar to what one would obtain from broadcast television. The benchmark is broadcast television, which is a key differentiator.

This paper is based upon the author's past and current experience in franchising systems.[2] It is in many ways a summary of several cases with the observations being grouped in a summary rather that detailing the issues on a town by town basis. This paper reviews the technical and regulatory aspects of current broadband and then reviews the current process of franchising including time and costs factors based upon recent cases. The results presented are summary results.

A recent paper in Foreign Affairs by Bleha attempts to explain why the US has low broadband penetration. He argues that the reason is the Bush Administration and that there is no Federal policy to develop broadband. There are two main problems with Bleha's approach, first it assumes that the United States is some form of centrally controlled socialistic government with a central planning group, and second he has no awareness of the facts as they exist in the United States. Leaving apart the socialistic tendencies of the author, let us first address the facts. The reasons why broadband does not work in the United States are simple.

(i) Franchise Process

The Franchise process is required everywhere in the US. Specifically it is required when the provider of broadband is also a provider of video at a fee and where the broadband provider uses the public right of way, no matter how limited. Thus if one were to pull a single strand of fiber across a town street and then provide a wireless network putatively this require a franchise.

How complex is this franchise process and how costly is it? We have been focusing on towns of about 2,500 to 5,000 households. For a town of that size, of which there are more than 20,000 in the US out of a total of slightly more than 30,000, it takes a team of two people about a year to eighteen months. It requires a law firm, feasibility studies, strand mapping, and ongoing contact with town managers, selectmen, town leaders, and any and all others involved. It is also a competitive process with the incumbent having a hidden seat at the table. The town and the incumbent always try to raise the bar, to keep out the incumbent.

The town's view of this is best exemplified by an article in the January 5, 2005 Nashua Telegraph by reporter Dave Brooks:

"Hanover selectmen were particularly happy to ink this deal because they were also negotiating a new cable-TV franchise agreement with Adelphia. That put them in unique position of being able to play competing cable companies against each other. "Both parties were quite interested about the terms of the other agreement," said McClain, who with great self-control was able to keep herself from chuckling over

[2] The author was from 1980 to 1984 an officer at Warner Cable, subsequently Warner Amex, one of the largest multiple system operators at the time and a predecessor of Time Warner. During that period the author was personally involved in franchising for such cities as Pittsburgh, Boston, Phoenix, Houston, Dallas, Cincinnati, New York, Chicago, Columbus, and others. In addition the author is currently the CEO of Merton an independent fiber based broadband operator in New Hampshire, Vermont and Massachusetts.

phone. "We got some public-access equipment money that we probably would not have gotten otherwise." (The sound you hear is town officials throughout New Hampshire writhing in envy)"

The town plays one provider off against the other, assuming that the cost of doing so is negligible. The cost however is real and substantial. For Hanover as an example, the cost was eighteen months of two people plus lawyers plus engineering and marketing teams. It was estimated to be about $500,000, or $200 per household. At 25% penetration this is an added $800 per subscriber. Thus the town's strategy to get "more" is ultimately to the detriment of the customer who is strapped with an added $800. If a FTTH system was about $1,600 per subscriber without any of these costs, Franchising alone is a 50% increase in the costs. Is there any reason why Verizon and SBC are trying to do away with Franchising. It is not the franchise fee but it is the franchise process.

(ii) Franchise Coverage

The second element of hidden costs is the physical coverage requirement of a franchise. Towns in the franchise process demand greater and greater physical coverage despite the legal requirement of a level playing field. In all towns the incumbent has about 75% coverage. The rule is that they will cover areas with "*25 households per mile or greater*". However, the new entrant is often required to provide "100% coverage" or in most case 25% more that the incumbent. This is not negotiable. The cost of this is simple: if fiber costs $1,200 per customer in the higher density part of town, and that is say 66% of the town, then in the remaining 33% of the town there a few if any customers, then the $1,200 per customer becomes $1,800 per customer, or an increase of $600. This is the typical increase.

(iii) Internet Transiting

The connection to the Internet backbone is the next major barrier. The peering of Internet users occurs in the Internet backbone frequently with the Tier 1 Internet carriers such as UUNet (soon to be part of Verizon) and AT&T (soon to be part of SBC). They control the interconnection. In Hanover, NH, for example, to get such a connection one must pay about $400 per Mbps per month. Thus if one is watching 6 hours a day of HDTV on the broadband network using the Internet this would consume 20 Mbps for 25% of the day, or an average of 5 Mbps per month, for a fee of $2,000 per month per HDTV set! This will not work economically. By the way, this is NOT the case in any other country in the world, they all have national Internet exchanges, NIXs, which disintermediate this oligopolistic pricing mechanism.[3] In the US we have institutionalized it with the recent acquisitions by the two dominant RBOCs.

(iv) Litigation and Legislation: Barriers from Incumbents

The incumbents frequently have the advantage of "*the power of the lawyers*". Not the law but the lawyers. It is not uncommon for the incumbent CATV operator to instigate a law suit against a new entrant, such as a municipality, and attempt to bar any form of competition. This is an example of what happened in the Tri Cities case in the Chicago area with Comcast. In addition there is a tremendous push by the incumbents to craft and pass state legislation which would make it near impossible to get into the business if one is anything but the incumbent. The barriers to entry are being legislatively increased with the help of the incumbent and interested legislators.

In conclusion, the facts and history clearly shows that the Towns, via the franchise process and coverage requirements, add as much as $1,400 per subscriber in costs to deploy. The incumbent Internet backbone providers charge excessive pricing for backbone connections, having no relationship to costs. The incumbent broadband providers legislate and litigate against any new entrant. These four elements are clear barriers to entry for any new truly broadband carrier. They do not exist anywhere else but the US. The paucity of lawyers outside the US eliminates the litigation element, the lack of "town control" eliminates the arcane franchise process, and all other countries NIXs have disintermediated the Tier 1 carriers. These

[3] See McGarty, Internet Transiting. In that paper we develop a detailed analysis of the Internet connectivity and describe the evolution of the NIX architectures.

barriers will not only remain but will intensify in the US. They are, in my opinion, the real barriers to broadband. We develop this analysis in detail herein.

2. BROADBAND SERVICES AND ARCHITECTURES

We first start with a definition of broadband and then provide a summary of services and service characteristics.

2.1 Broadband: A Definition

Broadband is many things to many people. One measure of broadband is the penetration of fiber based facilities into municipalities. This measure reflects the recognition that fiber is a real broadband fabric.[4] The same can be said in many ways for a wireless network as well. The current state of broadband is as follows:[5]

Company	Total (000)	Quarter (000)
Comcast	7,408	416
SBC	5,608	504
Time Warner	4,122	209
Verizon	3,904	345
BellSouth	2,349	253
Cox	2,720	149
Charter	1,978	94
Bell Canada	1,936	128
Cablevision	1,441	88
Adelphia	1,396	80
Total Top 10	32,862	2,266
Total North America	43,269	2,942

Let us now define broadband in an expansive fashion. This will not be the manner in which the FCC defines Broadband as anything in excess of 200 Kbps. That definition is in our opinion self serving and is a sop to the incumbent carriers to allow them to feel that what they provide is a broadband offering. It also is a way in which the FCC as a result of the lobbying of the incumbents can workaround the 1996 Telecommunications Act and grant carve outs for continued monopoly control. Our definition is as follows:

First, broadband is defined in a more expansive manner than most regulatory agencies have defined it to date. It is more than DSL and more than cable modems. Broadband is truly data provided in as fast a manner as is possible by having direct fiber connectivity to each user.[6] Broadband is a VLAN technology set employed over a very wide area. This is a very powerful definition, because we have seen that fiber capacity is a never decreasing value, in fact it has been increasing dramatically over the past few years. For a benchmark we mean that the fiber supports at a minimum 100 Mbps or more per user. Moreover, broadband is further defined as an enabler. It is devoid of any content or service but it is capable of providing an open pathway to facilitate any and all applications.

Second, Municipal may mean many things. It has meant the fact that the network is "owned" by a municipality. It has meant that it "covers" only the municipality. It has also meant that it is provided for the "benefit" of the municipality. For our benchmark, we focus on the coverage characteristic, independent of

[4] See papers by Gillett et al for a summary of the penetration of municipal broadband. The work of this MIT policy group has been focusing on municipals. There may be certain characteristics which allow municipals to grow and be successful but there is always the problem that scale is critical and the municipals have inherently no way to scale at the present time.

[5] See Teresa Mastrangelo, she reports 3M net adds for North American broadband Q1. Broadband now reaches 33% of U.S. households and 51% of Canadians. Mastrangelo created **broad**bandtrends.com, a service of The Windsor Oaks Group.

[6] See paper by Ismail and Wu on OECD Broadband Internet Access.

who may own, operate, or benefit from the network. To date, in the US alone, there are over 400 municipal broadband networks. [7]

In summary, What is broadband? Is it 200 Kbps, more, 1 Mbps, or more, 10 Mbps or more? In our definition, broadband is:

1. 10/100 BT connections to each user at a minimum with a 10+ Gbps backbone locally. It is also growable and scaleable. It would allow direct connection with backbone speeds.

2. An Open network, allowing any user to connect to any other user, at zero marginal cost. It is an outlet or portal.

3. Fully interconnected regionally and ultimately nationally. It is a network which allows local to local interconnection. It is not an island network, allowing only interconnection via proprietary and hierarchical points of entry.

4. An Open network allowing any purveyor of services to connect in any manner and any place to any user. It is a network which creates an electronic open and competitive marketing and distribution channel.

Interconnectivity and opens are key elements as are key factors as is the ability to have an expandable and scaleable network. A mere fifteen years ago there were discussions on bringing TCP/IP up to the speed of DS3 or 45 Mbps network. It was thought at the time that such a high speed would be prohibitive. In fact it has scaled way beyond that. Moreover the same was felt to be true about the scalability of Ethernet, limited to 10 Mbps, but now scaleable to 10 Gbps and beyond.

This then leads us to asking the first of a set of questions.

The ***first*** question we then pose is; *What is the future of municipal broadband and how will that future impact the existing telecommunications providers; Internet, telco and cable purveyors?*

The current mode of evolution of municipal broadband is one driven by the deployment of local networks. By local we mean small self contained networks which have direct end user connectivity. Each local network may be considered a closed island of communications capability with a single point of egress to the Internet backbone or some similar third party content provider. The current state of deployment now also begins to consider regional, state, and possible national deployment. This next stage of deployment of these networks will require significant thought and planning to ensure that what is achieved has the capabilities of a truly open broadband network. This will be the only way in which both the economic and social benefits may be achieved.

The ***second*** question we pose in this paper is; *What are the goals and concomitant architectural parameters for the successful deployment of interconnectable municipal broadband networks?*

This paper addresses broadband from the perspective of the local deployment, first, and then the integratability of those local networks into the existing national and international networks currently in operations. The overriding principle of this analysis is to ensure a fully open and scaleable and integratable network, one that empowers both economic and social development. This calls for a set of overall criteria and a means to allow those criteria to take hold.

Thus the ***third*** question for this paper is; *What are the minimum standards for the deployment of municipal broadband networks and how should those standards be set, managed, and updated?*

[7] See: http://www.tiaonline.org/media/press_releases/uploads/FTTH04list.pdf for some recent statistics.

In the initial development of the Internet, the U.S. Advanced Research Projects Agency, ARPA, set the base for commonality and openness. Following that IETF, the Internet Engineering Task Force, was a brilliant and effective colloquium that provided a truly evolutionary like stands process, what work survived, what did not disappeared. The same paradigm of establishing an agreement in a survival of the fittest mode is called upon for local broadband as well.

The development of infrastructure for municipalities has been shown time over time to be the basis for significant economic development of the municipality as well as enhancing the services available to the members of the community. Infrastructures such as schools, roads, water and sewer, power systems have been typical examples. The current development of broadband communications services, driven by Internet access and related services, is the current example of such a new infrastructure. [8]

The current typical positioning of broadband is that it can do what the telephony and CATV providers can do today but "better, faster, and cheaper". This is what we call the "double-triple" play; three services (Internet access, telephony, and video) with three elements of improvement (better, faster, cheaper). In fact, as one explores the market and listens to what the users are really saying, they see broadband as having two key characteristics; openness and localism. Neither of these two characteristics relate to the standard services proposed nor do they relate to the characteristics of those services.

2.2 Broadband Architectures and Technology Issues

There are three issues we discuss herein that relate to the overall issue of franchising. They are:

Architecture: What is a broadband network and how can users access it. The key point we bring to the fore is that like the Internet any broadband network must be open, and using IP protocols, it must allow the intelligence to reside at the edge of the network. Ultimately any and all broadband fabrics are architected around an IP base.[9]

Wireless: We discuss wireless as both a stand alone option and in comparison and conjunction with fiber. This is possibly an architecture; adjunct but it is key that anything one does with broadband from a regulatory perspective be technologically neutral. That principle of technological neutrality is essential to any success. We show that there are today regimes where each of the current wireless technologies play a role. As time progresses these regimes will change and operators must be able to adapt accordingly.[10]

Content: As the network is technologically neutral and open, the ability to provide any form of content should also. The recent decisions by the FCC to permit IP Voice to be viewed as an information services, yet to be challenged by the DC Federal Court, as it appears all FCC decisions are, we believe that IP Video, for exactly the same reasons should be viewed as an information service. This is a critical difference and if done so then the local control over video goes away. In this context we review IP video.

The architecture for broadband is fundamentally different that that for cable television. It is argued that this fundamental architectural and operational difference sets broadband aside from what the regulators call video services and programming. We provide a high level overview of these difference and focus on the key differentiators.[11]

[8] For economic development analyses see the papers by Samuelson and Varian, and Gillette, Lehr and Osorio, OTP Paper of US Dept of Commerce, September 2002,

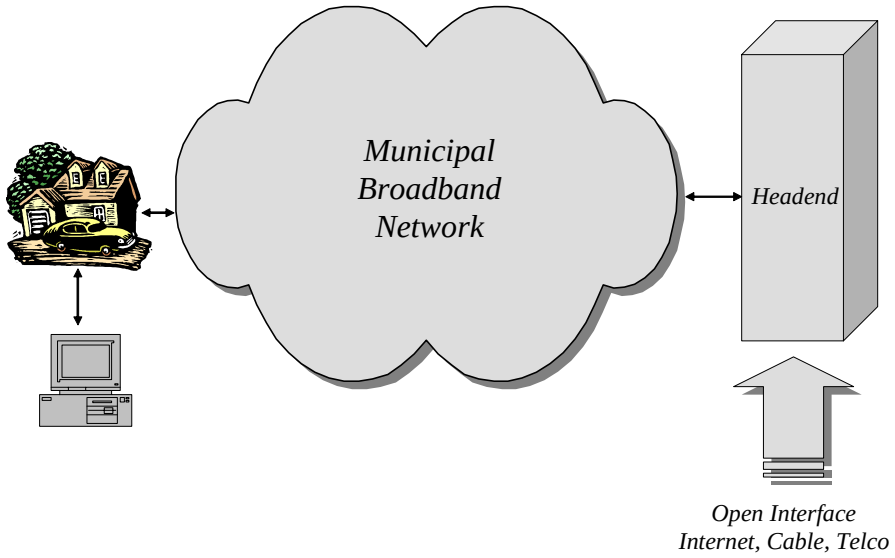
[9] See McGarty paper on Architectures, 1990 Harvard and 1993 for Internet at Harvard conference.

[10] The paper by McGarty at Columbia 1996 and the paper in Telecommunications Policy 1997 focus on broadband and triple plays for wireless systems.

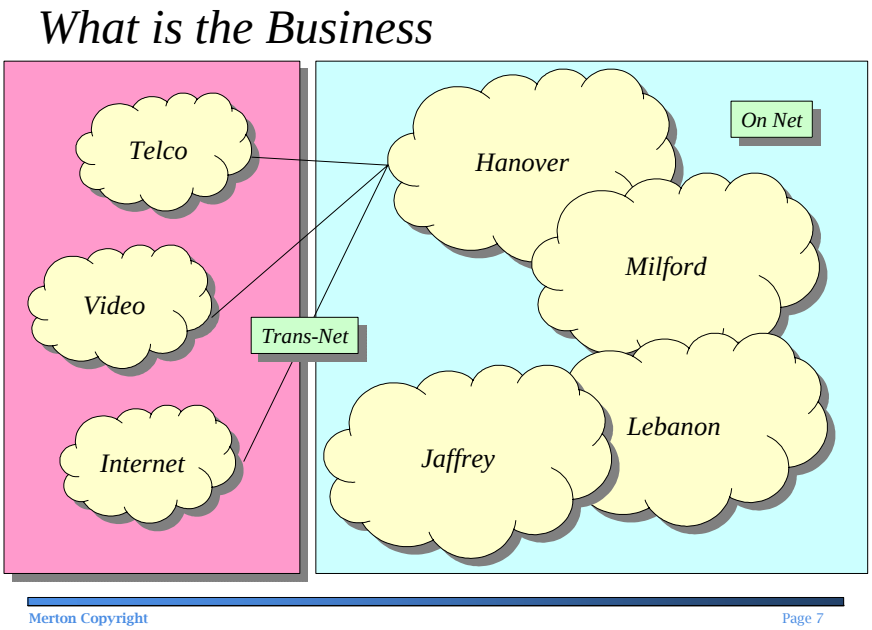
[11] See papers by McGarty relating to the details of the architectures and their functions and costs.

2.2.1 Local Network Interconnection

The BBN can be depicted as below. One end of the BBN, the head end, has an open interface suitable for interconnection to a variety of service providers. The interface is open to any and all, and is not proprietary in any fashion. The other end of the BBN has an interconnection to the home. The interconnection may also be to educational institutions, fire, police, libraries, municipal facilities, and to commercial entities as they may request. The network in-between the two interconnecting points is an optical fiber network with drops of fiber to each subscriber. The fiber drops are provided on an as-requested basis. The network does not have to be deployed fully day one. It can be built out as demand warrants.

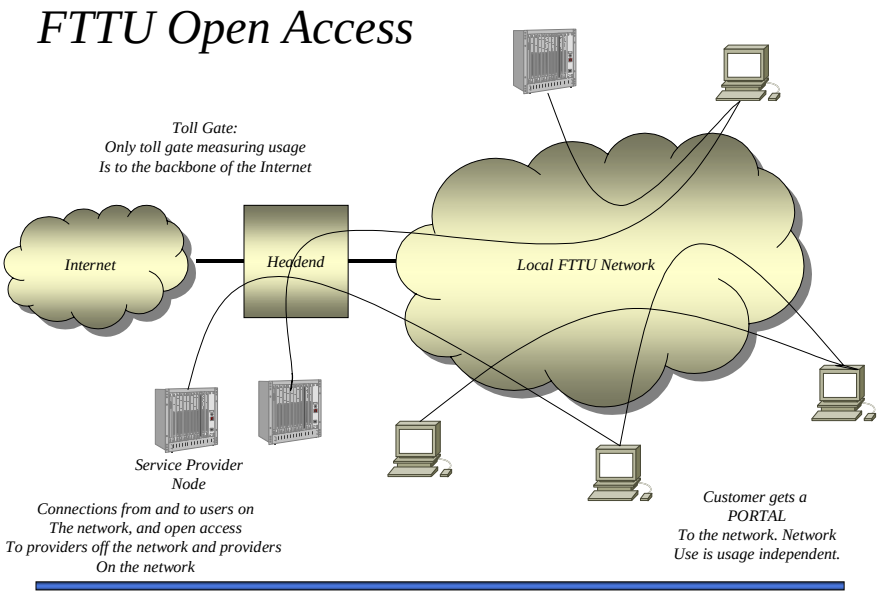


Another view of the network is shown below.



2.2.2 Local Open Networks

The following depicts the local openness of the network. Each user of the network can connect to any and all other local users via the IP capabilities of the network. Each connection to the network has an IP or IP addressable port. The connection is via ports, elements which can enable communications and interconnectivity between any user. The network is flat and open not hierarchical and closed. This is a key fundamental difference in network architecture design and implementation.



2.2.3 Interconnected Open Networks

The following depicts the interconnection of three regional BBNs. This interconnection is readily achievable via the use of the IP standard interface. Clearly some form of DNS, Domain Name Servers must also be employed and naming and address management will be an issue however the ability to interconnect at layer 3 is critical.

2.3 Recent Market Research

There is also the question in the broadband community as to what the true demand for broadband is. This is a difficult question because it presumes that the person being questioned has an understanding of what broadband is. Is it DSL, cable modems, or much more as we speculate herein. To answer this question we have performed extensive market research in New England. The following is a list of all towns we have studied and the level of effort on each. This ranges from 50 towns which have been contacted to one financed by RUS and one final franchise with a total of 11 franchise applications in process.

Town	*State*	*Contact*	*Selectmen*	*Market Study*	*Engineering Study*	*Feasibility Study*	*Franchise Request*	*Franchise Approval*	*RUS Application*	*RUS Approval*
Acton	MA	x	x							
Attleborough	MA	x								
Belmont	MA	x	x	x	x	x	x			
Concord	MA	x	x		x		x			
Leverett	MA	x	x							
Martha's Vineyard	MA	x	x	x	x	x	x			
Newburyport	MA	x								
Norwood	MA	x	x							
Princeton	MA	x	x							
Reading	MA	x	x							
Shutesbury	MA	x	x							
Wakefield	MA	x								
Wellsley	MA	x	x							
Weston	MA	x	x	x	x	x				
Westwood	MA	x	x	x	x	x	x			
Amherst	NH	x	x	x	x	x	x		x	
Bedford	NH	x	x	x	x	x	x		x	
Bow	NH	x								
Brookline	NH	x								
Chesterfield	NH	x								
Colebrook	NH	x	x	x	x	x	x			
Concord	NH	x	x							
Derry	NH	x	x							
Dublin	NH	x								
Fitzwilliam	NH	x								
Goffstown	NH	x	x	x	x	x	x		x	
Hampton	NH	x	x	x	x	x	x			
Hanover	NH	x	x	x	x	x	x	x	x	x
Harrisville	NH	x	x	x	x	x	x			
Henniker	NH	x								
Hollis	NH	x								
Hopkinton	NH	x	x	x	x	x	x			
Jaffrey	NH	x	x	x	x	x	x		x	
Keene	NH	x								
Lebanon	NH	x	x	x	x	x	x		x	
Manchester	NH	x	x							
Marlborough	NH	x	x	x	x	x				
Merrimack	NH	x	x	x	x	x	x			
Milford	NH	x	x	x	x	x	x		x	
Nashua	NH	x	x							
Peterborough	NH	x	x	x	x	x	x		x	
Rindge	NH	x	x	x	x	x	x		x	
Swanzey	NH	x	x	x	x	x	x		x	
Troy	NH	x	x	x	x	x				
Warner	NH	x								
Winchester	NH	x	x	x	x	x				
West Warwick	RI	x								
Brattleboro	VT	x								
Norwich	VT	x								
White River Junction	VT	x	x	x	x	x	x		x	
Count		50	35	23	24	23	20	1	11	1

The above Table depicts the 50 municipalities that were addressed in this study. All were approached from a business perspective and all were asked if they wanted broadband using a fiber to the user approach. Of the 50, 35 provided a strong affirmative reply resulting in selectmen presentations. 23 market surveys and 24 detailed engineering studies were produced and in some cases these were done on multiple occasions. This resulted in 23 detailed feasibility studies. 20 franchises were requested in the process. We also applied for RUS loan for 11 municipalities and had received approval for one. The remaining 10 were withdrawn based upon the continuing problems with Hanover. Merton was subsequently liquidated as a result of the inability to obtain satisfactory terms for franchises. In fact not one municipality was willing to adhere to the level playing field requirement and each municipality added on additional requirements averaging 2.2 times the coverage for the incumbent.

This section details the results of one typical town, Hanover, NH. Hanover is a typical New England Town of approximately 3,600 households, HH, and 2,600 houses and approximately 1,000 multiple dwelling units, MDUs. Hanover has Dartmouth College and Mary Hitchcock Hospital. It is an upper middle class community with a 92% Internet penetration. This is typical of most New Hampshire HH.

2.3.1 Overall Summary

We performed two detailed market research studies in 2003 and recently in 2005. The following Table summarizes the results on key demand questions between these two years.

	2003 Percent	*2005 Percent*	*Diff 2005 v 2003*	*2003 HH*	*2005 HH*	*Diff 2005 v 2003*
Internet	46.1%	36.0%	-10.1%	1,153	1,296	143
Video	34.0%	36.5%	2.5%	850	1,314	464
Voice	0.0%	44.4%	44.4%	-	1,600	1,600
On Net Business	0.0%	31.7%	31.7%	-	1,143	1,143
On Net Local	0.0%	31.7%	31.7%	-	1,143	1,143

The results show the following:

- Broadband demand is down 10% but video is up and voice is now almost 45%, an unexpected demand element. The surprise has been the demand for telephony. This did not appear two years ago but in the current study people now understand that VOIP is a viable technology and is a good economic alternative. The customers also want one package. The demand for broadband here is one for true broadband. In 2003 there was no distinction between any broadband. After two years of promoting the service in Hanover the people now know that when we asked for broadband demand we meant FTTH. Thus the 36% demand is for true broadband. This may imply the 10% reduction is due to clarity and not lower demand.

- OnNet services demand is 32% and this has still not been put in a pricing model. The On Net services are whet we have been describing heretofore in the paper. They are such services as “best efforts” portal services which are 10/100 Base T connections to the network, V LANs, and service level guaranteed connectivity. They are also for consumers only. The commercial demand is on top of this demand number. The analysis indicates that the 32% demand means that 32% of the people want to have broadband not only for external connectivity but also internal. Cross tabbing this shows high correlations between the demands.

- Video demands have gone up slightly and this suggests a continuing dislike for the incumbent, which is Adelphia. Adelphia in this town has been bought by Comcast and this will most likely result in two things. First some modest improvement and second Comcast has the well established history of

litigating away any competitor. Thus the ability to enter Hanover and similar towns to provide true broadband may be reduced dramatically with the litigious entrant.

2.3.2 Detailed Questions

The following are the results of some detailed questions and their comparison form 2003 and 2005.

Would you be willing to pay $40 per month for a very high speed Internet connection that is up to a 1000 times faster than your current service?				
		Percent 2003	*Percent 2005*	*Difference*
	Definitely Not	22.5%	12.0%	-10.5%
	Unlikely	12.3%	21.6%	9.3%
	Possibly	19.1%	30.4%	11.3%
	Likely	16.4%	19.2%	2.8%
	Definitely Yes	29.8%	16.8%	-13.0%
	Total	100.0%	100.0%	0.0%

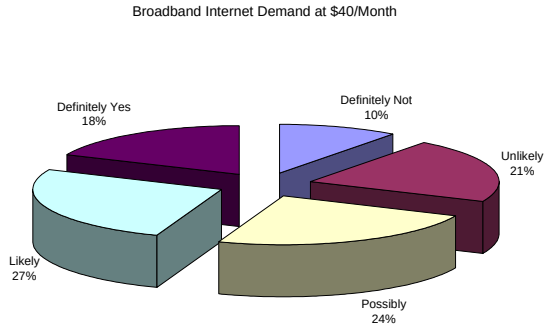
This question shows the following results:

- Target of Likely and Definite is now 36%. The largest decrease is in the Yes category. Based upon focus group analysis the reasons are they understand FTTH and this is what they really want and that the cable incumbent is performing better for those wanting just cable modems. The Yes group is clearly the early adopter group and show a strong demand and a strong understanding of what is expected in the 2005 numbers.

- "Possibles" have some conversion potential up to 31%, and we believe some share can be obtained, say one third of that total. This is most likely and educational efforts and increasing awareness.

- The NOs are down significantly, almost by half indicating a good positive change to use broadband.

The following summarizes the 2005 results.



The next question was related to the desire for video services.

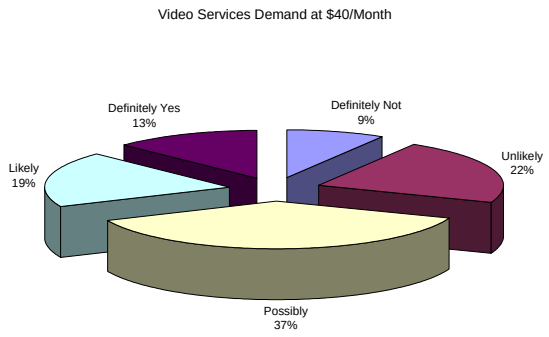
Would you be willing to pay $40 per month for high quality video service with a wide choice of channels for news, sports, music and movies?				
		Percent 2003	*Percent 2005*	*Difference*
	Definitely Not	25.2%	20.6%	-4.5%
	Unlikely	16.3%	13.5%	-2.8%
	Possibly	24.5%	29.4%	4.9%

	Likely	15.6%	23.0%	7.4%
	Definitely Yes	18.4%	13.5%	-4.9%
	Total	100.0%	100.0%	0.0%

This question shows the following:

- Video demand is slightly up from 2003. It is not clear why this is the case other than dissatisfaction with the CATV incumbent.

- The definite NOs are also down. This may be due to better understanding of alternatives.



- Total video penetration is still 88% which is at high end of national standard
- The satellite penetration is about 18% of the market
- Adelphia is remaining generally constant at percent levels
- Adelphia sale to Comcast and Time Warner is announced and in process
- Time Warner on April 21, 2005 announced that they will obtain certain New England Adelphia properties, this implies Comcast will obtain the properties in this market analysis.

The next question was related to the desire for telephony services. We did not ask this in 2003.

Would you be willing to pay $35 per month for unlimited local and long distance calling for US and Canada?

		Percent 2003	*Percent 2005*	*Difference*
	Definitely Not		10.3%	10.3%
	Unlikely		21.4%	21.4%
	Possibly		23.8%	23.8%
	Likely		26.2%	26.2%
	Definitely Yes		18.3%	18.3%
	Total		100.0%	100.0%

The results of this question could not be compared to 2003 results since in 2003 this was not asked. However:

- Voice was not initially targeted but there seems to have been some interest in 2003.

- Clear and unexpected demand for telephony and it exceeds all other demands. Based on post test focus groups this seems to be less any dissatisfaction with the incumbent ILEC, Verizon, than a market understanding that telephony is now a commodity which can be obtained by multiple means.

- This means one must provide this service to be competitive in any market. The problem is still that having broadband one is empowered as a customer to obtain this from a variety of providers and thus market disintermediation is highly likely. It is not clear how one makes a profit I the mid terms with strong commodity competition.

We also then asked the question of Internet provider.

What kind of Internet access service do you have at home?				
		Percent 2003	*Percent 2005*	*Difference*
	Dial-Up	73.5%	43.7%	-29.8%
	DSL	11.6%	32.5%	21.0%
	Cable Modem	1.9%	18.3%	16.4%
	Satellite	1.5%	0.8%	-0.7%
	N/A	11.6%	4.8%	-6.8%
	Total	100.0%	100.0%	0.0%

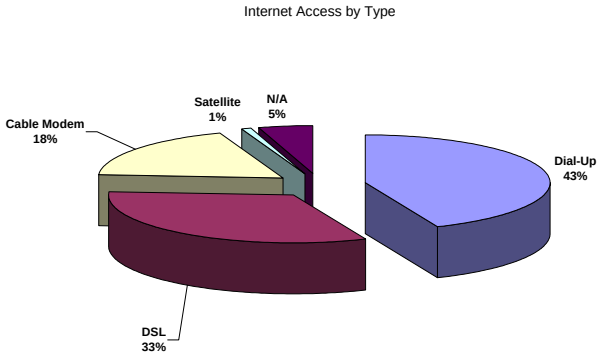
The above table is a summary of 2003 and 2005 changes in ISPs. The observations are quite clear:

- DSL and Cable modems have increased dramatically. There is a 10X increase in cable modems but what is most interesting is that the customers there are most likely to switch. DSL has increased 3X from a higher base and now represents 2X cable modems and almost 33% of the town. There is a strong desire to move with this base as well.

- The dial up base has almost halved as one would expect.

- The Internet penetration went from 88% to 95% which is the highest we have ever seen for a "typical" town, even a University town.

The following shows the breakout for 2005.

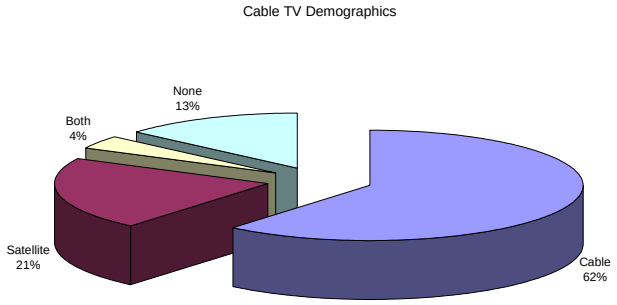


We then addressed the issue of what video provider they had. The following chart depicts this result:

Do you have cable or satellite television at home?				
		Percent 2003	*Percent 2005*	*Difference*
	Cable	62.9%	61.1%	-1.8%
	Satellite	19.4%	21.4%	2.0%
	Both	2.6%	4.0%	1.3%
	None	15.1%	13.5%	-1.6%
	Total	100.0%	100.0%	0.0%

We observed the following over the two year period:

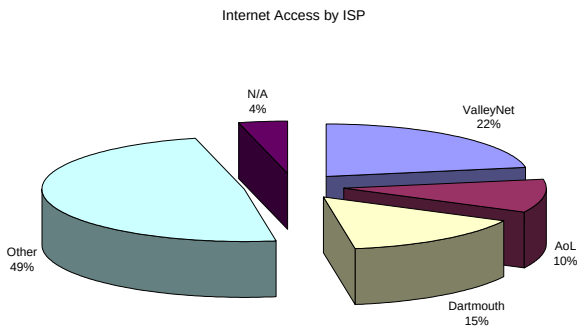
- Cable dropped a small amount but effectively remained constant in the margin of error.
- Satellite increased but like cable was constant in the margin of error.
- The homes having both statistically increased but represent a small minority at best. They use cable basis to get local news and use satellite for their main content.
- The HH having none remained constant on a statistical basis as well at about 13-15%.



Finally we asked who their Internet provider was.

Who is your Internet service provider at home?				
		Percent 2003	*Percent 2005*	*Difference*
	ValleyNet	33.3%	22.2%	-11.0%
	AoL	11.3%	10.3%	-1.0%
	Dartmouth	25.8%	15.1%	-10.7%
	Other	19.0%	48.4%	29.4%
	N/A	10.7%	4.0%	-6.7%
	Total	100.0%	100.0%	0.0%

- Note the ValleyNet has lost 1/3 of its market share
- AoL is also down slightly
- Dartmouth is also changed
- All of this is DSL and Cable modem moves
- ValleyNet strategy initially proposed is no longer viable, in addition the direct sales to customer is now key and is bolstered by having all three offerings.



3. FRANCHISES AND THEIR HISTORY

Franchises are one of the key issues delimiting broadband deployment. In thus section we provide an historical overview, a discussion of current franchise requirements and an analysis of the cost of franchising.[12]

3.1 Franchise History

Franchises have been in place for many years. They have gone through what we will call five stages:

3.1.1 Stage 1: Early Development and Rights of Way (1950-1977)

In this stage towns such as Altoona, PA were devoid of any television. The franchise was a means to obtain rights of way on systems, namely on telephone poles, and the towns received minimal payment for such rights of way. The content generally was off air retransmission. It was not until 1977 that HBO started to distribute via satellite.

3.1.2 Stage 2: Franchise Wars (1977-1987)

The Franchise Wars started in the late 1970s. These were the competitive biddings for the large metropolitan cable franchises. The author was personally involved in many of these, specifically: New York, Chicago, Phoenix, Boston, Houston, Dallas, Pittsburgh, Cincinnati, Columbus, Sacramento, and others. The strategy was to respond to city RFPs with detailed proposals and then to show how cheaply the cable company would provide basis service and also to show what other “gifts” could be made to the city. Thus pricing such as $1.95 per month for basis and the gift of hundreds of trees to line municipal roads were common. All parties knew that the bids were unrealistic but it was a land grab process amongst the larger cable operators.

In addition, during this period new services were promised and some actually introduced. Two way cable was pioneered by Warner with the Qube System. Telephony with Cox and the Indax system. Data networks with institutional cables and single mode fiber deployment, the first in the United States. New video programming was developed, for better or worse, to fill the new channels. Thus came HBO, MTV, Nickelodeon, Showtime, and others. Franchise became a process whereby cities grabbed for as much as they could since the viewed the cable bidders as willing and able to provide unlimited motivations to award franchises.

This period of over exuberance set the stage for things to come.

[12] For a more detailed analysis see the book by Huber as well as the one by Brenner. The Huber text is slightly influenced by Thorne a co-author and General Counsel of Verizon whose writings are highly polemical.

3.1.3 Stage 3: Renewals (1987-1995)

The original franchises had ten to fifteen year lifetimes. This meant that during this period, the franchise initially awarded were up for renewal. Several factors made this a contentious period:

First, the towns could see what was won during the Franchise War period and they started to demand the same and more.

Second, consolidation was commencing and this mean that the localism of the original players was being replaced by more centralized corporate types.

Third, the actual content available was expanding and improving. This meant that the profitability for cable was significantly increased and this towns asked for more of the pie.

Fourth, the FCC and Congress intervened with a very heavy hand on re-regulating cable.

These reasons led to certain uncertainty in the industry and sales prices of cable systems reflected this uncertainty.

3.1.4 Stage 4: Overbuilders (1995-2001)

The key event in this stage was the Telecom Act of 1996. It deregulated cable again and laid at the feet of cable the ability to provide telephony. Thus the cable providers were considered broadband players.

A second driving element was the Internet and that cable could provide high speed Internet access. The industry provided lower cost cable modems and this was the start of a revenue doubling for cable operators.

The driving factors in this phase were clearly:

1. Deregulation
2. Cable Modems and Internet Demand
3. Expanded Content
4. Consolidation: for example the purchase by ATT of TCI and then by Comcast.
5. Telephony as an added service

This was the most recent phase with the introduction of companies like RCN, Utilicom, and others who attempted to become competitors in established markets by overbuilding. The companies sought franchises as basically proprietary franchises. Some companies, such as RCN also sought to obtain in certain of its markets Open Video Service Franchises. The Overbuilders were driven by the exuberance of the late 1990s to build in markets where they could hope to obtain reasonable market share. In fact they did obtain in many cases more than 50% of the market. There were very few, percentage wise, new franchises.

Another trend in this period also was the development of municipal owned networks, and these were generally overbuild networks. Examples are Norwood MA, Tewksbury MA and others. These networks operated without a formal franchise and there have always been questions concerning their fairness and legality. In these cases it is impossible to see how an arms length negotiation could ever occur with the franchise process.

3.1.5 Stage 5: Broadband Operators (2001-Current)

The current market is set for the expansion of broadband. This would include the ILECs and other independent players. However, at this point the franchise has reached a new level as a hurdle to entry. Renewals for incumbents are still a matter of daily course and the towns uses these as hurdles that the new entrants must exceed, not just meet. However, there are fundamental differences in broadband. Broadband is typically and IP, Internet Protocol, type of network and further the networks are inherently open,

allowing users connected to the network to become their own distributors of broadband content. In addition there is a change in the way media is being distributed, namely through an IP format much more akin to information than video as we know it. The video is interactive, intermingled as packets with Internet and voice, as well as many other IP based services. Thus the framework of the franchise discussions is changing rapidly and the towns and cities are ill equipped to deal with this change. Their approach is just to raise the bar and attempt to obtain more.

This stage in franchising can thus be characterized as follows:

Incumbent at the Table: The incumbent is directly or indirectly at the table in every negotiation. The towns are frequently dealing with the incumbent and the incumbent has more knowledge of the franchise of t the new entrant than the new entrant of the incumbent. There is a clear imbalance in negotiating strength favoring the incumbent.

Higher Hurdles: The towns are continually raising the hurdles. They see that competition to them represents more revenue and as such make demands to maximize that revenue potential. They demand better coverage than the incumbent, more local services, greater reporting of performance, and increased fees. Thus the cost of entry to a new competitor is greater than maintaining the presence by the incumbent. All of this is driven by the local power that be.

Open Networks: The networks of the new entrants are generally open networks, allowing local users to become their own nodes on the network. The concept of a head end as the single point of entry will disappear. The network architecture allows for any IP based system to interconnect and through the IP fabric interface anywhere on or off the network.

IP Driven Systems: IP is the essence of networks going forward. This means that the network is minimalist in design and all intelligence is pushed to the edge of the network. IP empowers multiple IP based appliances, from he standard video voice and data to web cams, medical devices, security systems, and monitoring home appliances. IP is a facilitator of technological expansion.

IP Video and Mixed Messaging: IP video is a key element in this new networking world. IP video is not broadcast video. The IP video signal may originate from one or many locations, each packet is sent over different paths, it may be interactive, thus having the ability to change one program from another, and finally IP video packets are indistinguishable from any other packet and are generally and unidentifiable. Finally with an open IP network anyone may become an IP video purveyor. Thus if a video producer wants to establish a new distribution channel for their film, they can do so via local servers on the open networks. It is impossible then to distinguish content purveyors from one another. IP video changes the whole definition of video. It looks and acts like an information service not like a video broadcast transmission.

3.2 Objectives

This paper focuses on the franchise process during this fifth stage of evolution. Our objectives in this paper are as follows:

1. *To define and describe broadband from an expansive perspective focusing on the elements which maximize its overall economic value to a large a constituency as possible.*

2. *To identify alternative technologies and how they may be used in an integrative fashion with fiber as a total least cost broadband fabric.*

3. *To identify changes in the distribution and marketing channels which can establish new economic growth and relate them to the inherent broadband infrastructures.*

4. *To examine by means of specific cases the franchise process as it stands today and identify it characteristics.*

5. *To use the identified characteristics of franchising and relate them to the effectiveness and economic viability of deploying broadband in a competitive environment.*

6. *To evaluate the overall effectiveness of the franchise as a process, compare its historical context to the changing technology bases and assess it effect on broadband in an ongoing basis.*

7. *To prepare recommendations of how from a legal, regulatory and public policy perspective one should handle both broadband and the franchise process.*

3.3 FCC Definitions

In this section we use the state of New Hampshire as the basis for subsequent case studies. We first use the FCC definitions of video services and then using New Hampshire law examine what is expected. We then disassemble a typical franchise to see what the municipality is demanding.

The FCC is ultimately the basis for all key definitions. Using the FCC definitions, New Hampshire Franchise Agreements define the following:

Video Programming. Programming provided by, or generally comparable to programming provided by, a ***television broadcast system***.

The question then is what is a "television broadcast system? Also, what is programming? Above, when we dealt with IPV we clearly showed the dramatic structural difference between IPV and Video Programming.[13] Recall that an information service allows: "*…the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications,…*"**.** Indeed, this is just what we have shown IPV to do.

Video Programming Provider or VPP. Any person or group of persons who has the right under the copyright laws to select and contract for carriage of specific Video Programming on a Video System.

This can be a broad based definition. This easily expands it to any person who has content and with an open system it opens the market is a wider base of such providers.

Video System or VS System: A facility consisting of a set of open transmission paths and associated signal generation, reception, and control equipment that is designed to provide VS Service which includes video programming and which is provided to multiple subscribers within the Town, provided that the FCC has certified that such system complies with 76 CFR 1500 et seq.

This includes the FCC certification.

Video System Operator (or VS Operator): Any Person or group of Persons who provides VS Service over a Video System and, directly or through one or more Affiliates, owns a significant interest in such Video System, or otherwise controls or is responsible for the management and operation of such a Video System.

VS Service: Includes the video programming services distributed by a VS Operator or its Affiliate directly to their Subscribers in the Town for use of the VS Operator's broadband hybrid fiber coaxial transmission facilities.

Thus, we believe that by a simple analysis of what IP video can do and how it inherently works we have at most an information service and not a video programming service.

[13] See Act defining Information Service: **(**41) INFORMATION SERVICE- The term information service means the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service.

3.4 New Hampshire Law

We now focus on the state issues controlling the franchise process. The focus is on New Hampshire but one could just as readily look and any one of the states and their laws. In Exhibit 1 we present the NH law in its entirety. In this section we focus on several key elements.

Under New Hampshire law a franchise is required before construction. Specifically it states:

"RSA 53-C:2 Franchise Required. – *I.* ***No company shall construct, commence construction, or operate a cable television system in any municipality without first obtaining a written franchise*** *from the franchising authority of each municipality in which such system is installed or to be installed."*

In addition there is the "level playing field" clause. It clearly states that the terms must be comparable. This problem here is what is the definition of comparable. If the franchise is an OVS franchise[14] and the incumbent is not, does the OVS requirement get balanced with the proprietary requirements? The answer is a resounding no. The towns want OVS plus the burden of the proprietary. The second question is level at what point in time, the incumbent has been around for thirty years and has had an embedded advantage. Their renewal is for 5 years. Then the town gives the new entrant 5 years. Again hardly a level playing field. Finally, and this runs rampant in the process, the invisible seat at the table. The incumbent negotiates on its own behalf and also directly against the new entrant, in cooperation with the town. All or some of these actions taken by towns destroy the concept of the level playing field.

"RSA 53-C:3-b Franchises; Administration by Municipality. – *I. All franchises shall be nonexclusive. No municipality* ***shall grant any additional franchises to cable service within its jurisdiction on terms or conditions more favorable or less burdensome than those in any existing franchise within such municipality****. II. Nothing in this section shall be construed to prevent any municipality considering the approval of an additional cable service franchise in all or any part of the area of such municipality from imposing additional terms and conditions upon the granting of such franchises as such municipality shall in its sole discretion deem necessary or appropriate….."*

These are but a few of the issues which a new entrant faces as the try to build a new broadband infrastructure.

3.5 The Franchise Process

This section presents the results from several recent actual franchise processes.[15] The specific towns have not been identified and the characteristics are an amalgam of all of the towns. This represents the effort over 35 towns and cities in Massachusetts, New Hampshire, and Vermont.

3.5.1 The Franchise Elements

The Franchise process is fairly well understood. It is characterized as follows:

Local: The process is always local. This means that one must deal with a new cast of characters in each town and that each of these has a different set of agenda and each has a different style and needs and wants.

Adversarial: The process, no matter what the intent is at the beginning, is always adversarial. This is due to the presence of the attorney for each side as well as the town being in the position of "wanting" more each time it gives away a franchise.

[14] See 47CFR76.1500

[15] See Brogan & Cleland and Verizon Filing July 23, 2004. The Verizon plea to the FCC is one that says that Franchises are the ultimate stumbling block to broadband.

Unseen Seats at the Table: One of the most difficult problems in an overbuild franchise is the incumbent. The incumbent may actually have an unseen seat at the negotiating table, demanding the terms meet or exceed whet the incumbent has. Typically this is seen in the length of the franchise. The incumbent may be facing, after two renewals, a shorter term, say 5 years. The incumbent then demands the town use the same for the new entrant, albeit the incumbent had two back to back 15 year agreements. Parity is not well understood.

Competitive: The process is competitive; with the incumbent and with the town. It is not a process of well defined meets and bounds but a process of ever increasing hurdles. Event though there is a level playing field requirement the towns keep raising the bar each time they get a bite from the apple.

Uncontrolled and Unmanaged: The franchise process generally is not a managed process on the part of the town. It is not one persons job and thus there are many hands in the process, and these hands come and go. Thus when one believes that something has been accomplished it may be reset with the introduction of a new person.

Political: This means that one must spend a great deal of time politicking the proposal, working with the town decision makes and insuring acceptance. This requires a unique set of talents, political, social, technical, market, financial, which are rare to find and thus impact on the ability to scale. More will be said about this latter.

Non Scaleable: The process is not scaleable. That is having done one, it is not easier to do the second. It starts all over again. Even if one has done a hundred, the hundred and first is just as complex as any one of the preceding franchises.

Lack of Consistency: There is no necessary consistency from one town to another or from one agreement to another. There may be a set of state wide lawyers who assist the towns but each franchise is its own adventure. The impact of the incumbent, the influence of local citizens with their own interests or town interests, the impact of local politicians all add to the process.

The specific elements of the process in time are as follows:

Market Study: This requires a clear understanding of the market demand and a key part of that is displacing the incumbent. Generally the demand is well understood the issue will be the switching costs of getting a new customer. These are low in areas where the incumbent has a poor position in the market because of poor service or product.

Vendor Analysis: Vendors must be chosen for each town. In some cases the same vendor may be used but clearly the process must be repeated over and over. Part of the process is to understand the costs of deploying the system. The vendor work on fiber build, make ready, and installation costs are critical to the design.

Engineering Study: The engineering study is the walk through in the system. It requires strand mapping, pole counts, measurement of frontages and set backs, documentation and analysis. It also requires detailed make ready assessments and buried versus aerial analysis.

Financial Analysis: After all the work has been done on costs and revenue, a detailed financial plan is prepared. The town may ask for some of this detail.

Franchise Process and Negotiations: A this point the franchise process itself begins. It is composed of the following elements:

1. *Requesting a Franchise From the Selectmen:* This means that the town manager or equivalent can be persuaded to have the company present to the Selectmen for the request. This may take two or more meeting spread out over three to six months. The Selectmen may ask for more detail and may further ask for more concessions. At this point no negotiations have started. There is also

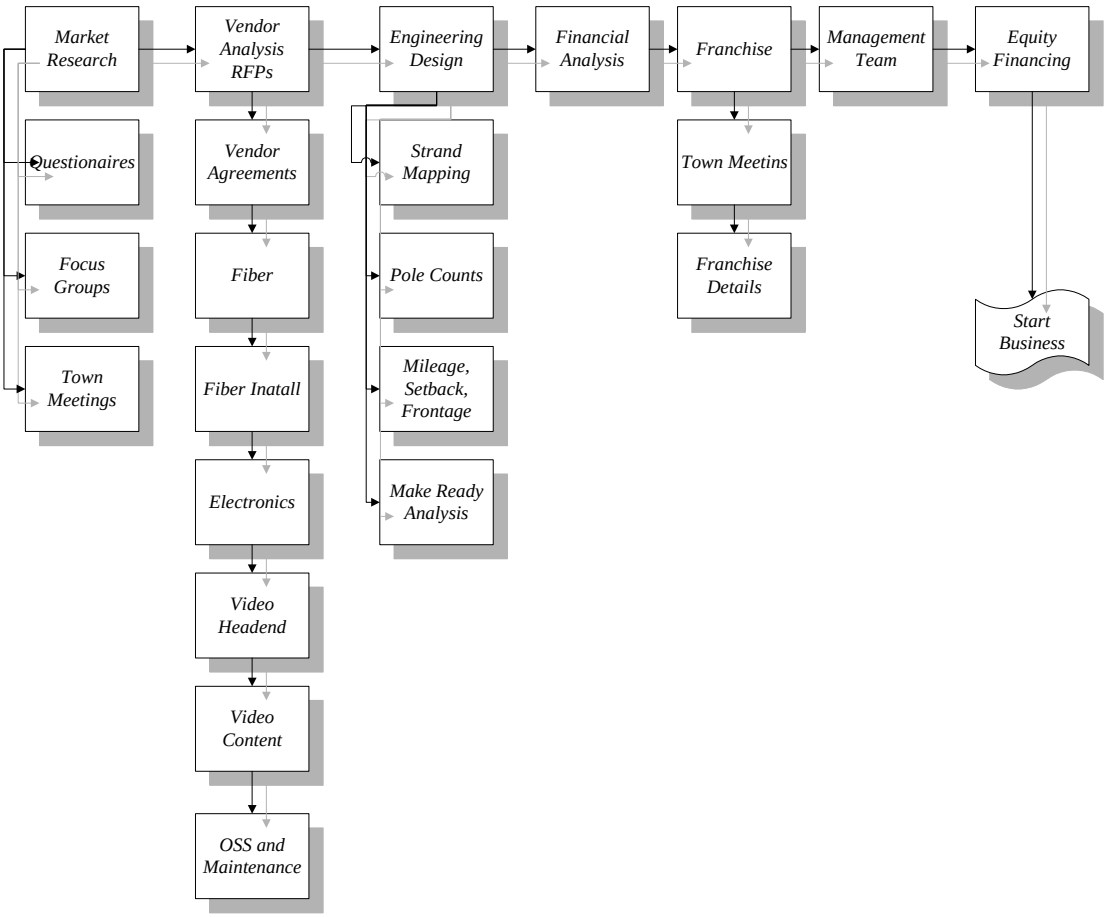
significant citizen input, as well as input from perceived competitors, including the CATV incumbent.

2. *Vote to Enter Negotiations:* This vote is critical. At this point the town appoints a negotiator and an attorney. The key problem is that the towns negotiator may change or the negotiator may have no skills at negotiating. Also the negotiator may have a set of biases which make the process untenable.

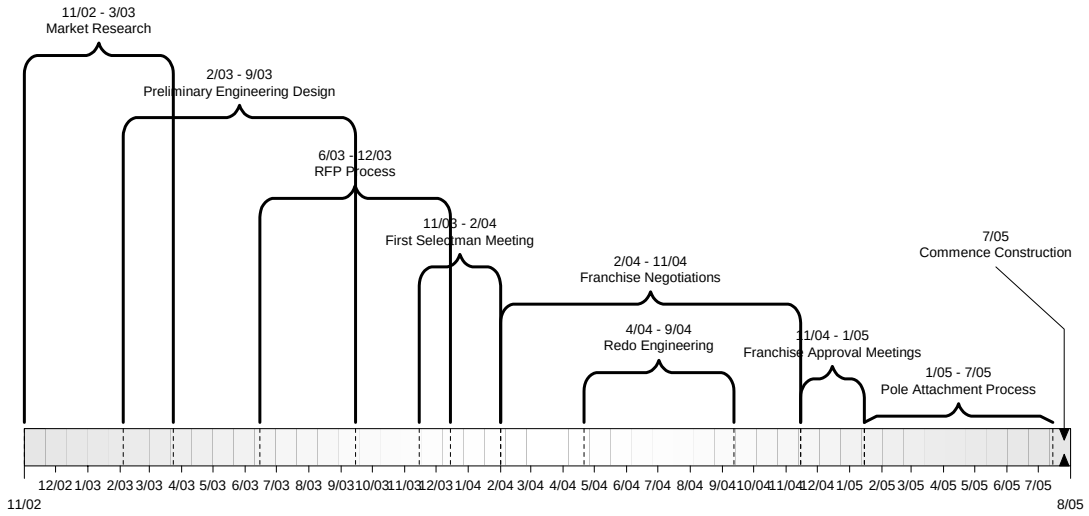
3. *Negotiations:* This is the longest phase. If one is lucky there is an existing franchise to be used. Generally this is not the case and a new one is prepared. This is done for the reason of trying to gain more by using a newer form. This may take six to twelve months. Also new demands are made. Frequently a new engineering study is required. Strand mapping may require the towns presence. Areas not covered by the incumbent may now be brought to the coverage map. Frequently, despite the words in the franchise document, the operative document will be a coverage map, and frequently the coverage demands exceed that if the incumbent. Also frequently if an OVS franchise is sought the town not only demands OVS but all and more than the proprietary incumbent.

4. *Final Vote:* If one is lucky, at the end of this two to three year process there is a Selectman's vote. The control of this is in the hands of the town manager and the negotiator for the town. They can delay this for any one of a hundred reasons.

The following flow chart summarizes and details the steps discussed above.



The following is a typical time line process of the Franchise. This is based upon our experience in multiple towns and reflects actual timeframe dates. It takes almost three years before construction is commenced. The market research and engineering studies are all required inputs by the town in the process.



The above process clearly shows that the length of time for the franchise process is excessive.

3.5.2 Franchise Structure

Exhibit 2 depicts the contents of a typical franchise. We have reproduced this here as a table and have highlighted key sections.

Section	*Subsection*	*Comment*
ARTICLE 1 -DEFINITIONS		Generally these should comply with the FCC rehgulatoions in 47 CFR.
ARTICLE 2 -GRANT OF FRANCHISE		
	SECTION 2.3 - NON-EXCLUSIVE USE OF PUBLIC WAYS	The Right of Way issue is a key issue. The Franchise gives the entrant standing in seeking rights of way via pole attachments. However there are many other ways in which this can be accomplished.
	SECTION 2.4 - DURATION OF FRANCHISE	This is a key factor in making parity. It should be equal to the incumbent at its start not where they may be at the current time.
	SECTION 2.6 – GROSS REVENUE FEE	This is the franchise fee. It should match the incumbent. It should also not exceed any statutory limit. In an OVS system the issue again is who has responsibility for third party providers.
	SECTION 2.8 - TRANSFER OR ASSIGNMENT OF THE FRANCHISE	Transfers are key to liquidity events. This is often overlooked until the process becomes untenable. The clause MUST allow reasonable transfers.
ARTICLE 3 -SYSTEM SPECIFICATIONS AND CONSTRUCTION		
	SECTION 3.4 - PARENTAL CONTROL CAPABILITY	This is a positive control. The issue becomes in an OVS system who has the responsibility here.

	SECTION 3.8 – GOVERNMENTAL DROPS TO VIDEO SYSTEM	This is the free service. One must look at this in an open network fashion as we seek to provide fiber. The analogy to coax does not apply especially if IP is employed.
	SECTION 3.9 – INSTITUTIONAL NETWORK (I-NET)	The INet issue is again a problem in an IP oen network. Towns after long discussions fail to understand this issue.
ARTICLE 4 - TECHNOLOGICAL AND SAFETY STANDARDS		These are standard clauses.
ARTICLE 5 - SUBSCRIBER RIGHTS AND CONSUMER PROTECTION		These are clauses which the incumbent should be meeting. However we see that towns try to raise the bar in these clauses.
ARTICLE 6 - RATES AND CHARGES		The rates and charges are standard. However, again the issue is one of OVS and third party providers which the franchise holder has no control over.
ARTICLE 7 - REGULATORY OVERSIGHT		Again standard indemnification and representations and warrantees.
ARTICLE 8 - PUBLIC, EDUCATIONAL AND GOVERNMENTAL ACCESS FACILITIES AND SUPPORT		These are PEG issues. Frankly how mucy free access does a town require. This is frequently redundant.
ARTICLE 9 – FORECLOSURE, RECEIVERSHIP AND BANKRUPTCY		Standard clauses
ARTICLE 10 - MISCELLANEOUS		Standard Clauses
Exhibit 1 – Revenue and Fee Reporting Form		
Exhibit 2 – Municipal Drop Locations		This is where the town wants connections.
Exhibit 3 – FCC Customer Service Regulations		
Exhibit 4 – Schedule of Rates and Charges		This is the starting point of rates and charges. This is always a battle ground even for an overbuilder.
Exhibit 5 – Form for Annual Reports		
Exhibit 6 – Municipal and School Buildings and Sites Connected to the Institutional Network		
Exhibit 7 – Origination Locations		
Exhibit 8 – Build-Out Map and Construction Schedule		This is what is commited to be covered. In all cases the town wants more than the incumbent has. They will not bend on these issues. This is where the risk is in most franchises.

3.5.3 Franchise Costs

Now we can begin to consider the costs. We have shown that in our experience in over 35 towns that the process takes on the average two years. It also entails the effort of two senior people plus legal support.

The following Table depicts what we have experienced in a single franchise effort. This is for a town of an average number of households (“HH”) of 3,000. This is almost $300 per HH for franchise costs.

Cost Element	*Units (days)*	*Cost Per Unit*	*Total Cost*
Engineering Consulting Staff	120	$1,200	$144,000
Marketing Consulting Staff	90	$1,400	$126,000
Financial Consulting Support	70	$1,000	$70,000
Franchising Team (Employees)	300	$800	$240,000
Legal Support	55	$2,400	$132,000
Overhead % Salary		55%	$72,600
Misc Support & Travel			$35,000
Total			$819,600

The obtaining of franchises for larger systems will incur similar and not readily scaleable costs. When the author was doing franchises for the large Metro systems such as New York, Pittsburgh, Sacrament, Dallas, Phoenix, Boston and others, teams of dozens of people were deployed for a year or more. The number of questions requiring answering increases and the detail of the answers also did increase. Thus based on an analysis of the current small set of 41 towns in New England, and a prior set of almost two dozen large cities, the costs of $300 to $500 per household is not unreasonable. If we were to then do this on a per subscriber basis, then at 25% penetration this becomes $1,200 to $2,000 per subscriber. This is equal to and in many cases greater than the capital costs to build the system. It becomes a hidden costs element.

4. INTERNET TRANSIT

The "Internet" is actually a set of independent networks, interlinked to provide the appearance of a single, uniform, network. Interlinking these independent networks requires interconnection rules, open interfaces, and mechanisms for common naming and addressing. The architecture of the Internet is also designed to be neutral with respect to applications and context, a property we refer to here as transparency.

The major problem with the current Internet operations especially in the U.S. is the cost of transiting or interconnection. For example, in Hanover, NH the cost to connect an ISP to the Internet backbone runs $400 per Mbps per month. In Frankfurt Germany the cost to connect to Level 3 for all Central Europe is $12 per Mbps per month. Why the difference. Clearly buying power has something to do with this but also there are factors which go well beyond costs. This pricing is not cost based. It is what the market will bear. And in the current market, small players bear a dramatic price. However, most users do not demand great access. However consider the simple example of HDTV. If we want to get HDTV over the Internet at 20 Mbps per channel, and we desire to look at it 6 hours per day on one set this will cost a single user $2000 per month per channel for Internet Transiting! Hardly a pricing mechanism to promote the simplest of broadband applications.

4.1 Current Structure

Currently the control, management, and development of this overall interconnection scheme is held tightly within the United States, controlled by a closely knit group of twelve entities, six commercial and five U.S. government entities, called Tier 1 ISPs. This group is composed of the set of original ISP carriers and excludes such groups as AOL/Time Warner and other major players. It also excludes all major non-US carries and companies.

To support these customer expectations, an Internet service provider must have access to the rest of the Internet. Because these independent networks are organized under separate administration, they have to enter into interconnection agreements with one or more other Internet service providers. The number and type of arrangements are determined by many factors, including the scope and scale of the provider and the value attached to access to its customers. Without suitable interconnection, an Internet service provider cannot claim to be such a provider, being part of the "Internet" is understood to mean access to the full global Internet.

Connections among Internet service providers are driven primarily by economics—in essence who may have access to whom with what quality of access and at what price—but all kinds of considerations are

translated into policies, frequently privately negotiated, that are implemented in the approaches to interconnection and routing. A significant feature of today's competitive Internet service marketplace is that direct competitors must reach interconnection agreements with each other in order to provide the overall Internet service that their customers desire.

These business agreements cover the technical form of interconnection, the means and methods for compensation for interconnection based upon the services provided, the grades and levels of service to be provided, and the processing and support of higher level protocols. Interconnection also requires that parties to an agreement establish safeguards, chiefly in the form of rules and procedures, to ensure that one provider's network is not adversely affected by hostile behavior of customers of the other provider.

Approximately twelve entities, six commercial and six U.S. governmental entities[16], provide the backbone services, running over communications links with capacities measured in many gigabits, or billions of bits per second, that carry a majority of Internet traffic. These providers, termed "Tier 1," are defined as those providers that have full peering with at least the other Tier 1 backbone providers.

Tier 1 backbones by definition must keep track of global routing information that allows them to route data to all possible destinations on the Internet, which packets go to which peers. They also must ensure that their own routing information is distributed such that data from anywhere else in the Internet will properly be routed back to its network.

Tier 1 status is a coveted position for any ISP, primarily because there are so few of them and because they enjoy low cost interconnection agreements with other networks. They do not pay for exchanging traffic with other Tier 1 providers; the peering relationship is accompanied by an expectation that traffic flows, and any costs associated with accepting the other network's traffic between Tier 1 networks, are symmetrical. Tier 1 status also means, by definition, that an ISP does not have to pay for transit service.

Much of the Internet's backbone capacity is concentrated in the hands of a small number of Tier 1 providers, and there is some question as to whether it is likely to become more so, in part through mergers and acquisition. Concerns about market share in this segment have already emerged in the context of the 1998 merger between MCI and Worldcom, at that time the largest and second largest Internet backbone providers. In that instance, European Union regulators expressed concerns about the dominant market share that would have resulted from such a combination.

In the end, in order to get approval for the merger, some of MCI's Internet infrastructure as well as MCI's residential and business customer base was sold off to Cable & Wireless and the merger went forward.[17] Some of the advantage held by the very large players is due to their ability, owing to their large, global networks, to provide customers willing to pay for it an assured level and quality of service. Part of this dominant position also stems from their Tier 1 status, which assures customers (including tier 2 and tier 3 ISPs) of their ability to provide a high quality of access to the public Internet. In addition, Tier 1 providers, by determining how and with whom they interconnect, also affect the position of would-be competitors.

Below Tier 1 sit a number of so-called second and third tier service providers, which connect corporate and individual clients (who, in turn, connect users) to the Internet backbone, and offer them varying types of service according to the needs of differing target marketplaces. This class also includes the networks of large organizations, including those of large corporations, educational institutions, and some parts of government. These ISPs cannot generally rely on peering alone and enter into transit agreements and pay for delivery of at least some of their traffic.

The bulk of the Internet providers sit in these lower tiers. These include both a small set of very large providers aimed at individual/household customers (e.g., AOL) as well as a large number of smaller

[16] ATT, MCI/Worldcom (UUNet), Sprint, PSI, C&W, Microsoft, as well as, NASA, DoD, DoE, NAS, and other government agencies.

[17] See, for example, Mills, Mike. 1998. "Cable & Wireless, MCI Reach Deal; British Firm to Buy Entire Internet Assets." *Washington Post.* July 14, p. C1.

providers. These include providers of national or regional scale as well as many small providers offering dial-up service in only a limited set of area codes.[18]

4.2 Regulatory Environment

In September 2000, the Federal Communications Commission (FCC) and the International Telecommunication Union (ITU) expressed concern about the power and resulting anti-competitive behavior with respect to peering of the large Tier 1 backbones in the United States. The ITU was looking for some sort of governance to mitigate the situation, while the FCC (and the developed countries) was happy with letting the market decide who peers with whom. The FCC put out a report in September 2000 (FCC OPP Working Paper, September, 2000) that said, among other things, that there are certain valid reasons why a large Tier 1 backbone provider (which has made significant investment into its network) would not want to interconnect with a smaller backbone.[19] The FCC said there could be valid competitive reasons why this would be the case, and if the reasons were anti-competitive, the anti-trust laws would take care of them. In 1997, UUNet, followed by other large backbones, invoked competitive reasons in its attempt to end peering with a number of smaller backbones and instead charge them for transit. The increasing transparency of peering requirements since September 2000 was likely in response to this; the Tier 1 carriers attempted to show that when they denied peering to smaller backbones, they were doing so because of competitive--and not anti-competitive--reasons.

At around this same time, Level 3 was coming into the picture. Sprint refused to peer with Level 3 a few years prior to 2000, spurring Level 3 to became the champion of transparent peering requirements. Level 3's president and chief operating officer Kevin O'Hara said in September 2000, "We believe openly-published, specific and objective interconnection policies serve the Internet industry's best interests. We also urge all providers in the U.S. and internationally to follow our code of conduct - a self-regulated approach by our industry will lead to continued success and growth of the Internet."

Therefore, the publishing of peering requirements by Level 3 and Genuity (another of the first to publish), was probably in part an attempt to take away some of the market power of the big players. Level 3 was apparently having difficulties negotiating peering agreements when it first started doing so at the time their network was nearing completion. It wanted to take potentially anticompetitive options away from its largest rivals, the large backbones. It did so by putting pressure on them to publish their requirements and thereby (i) letting Level 3 know exactly what they needed to do to peer with the big players while (ii) making sure the large backbones couldn't exercise their market power by forcing small backbones (who may have demanded to peer with Level 3) to pay transit fees to them.

In summary, in September 2000, significant pressure was brought upon the large (mostly US-based) backbones by the FCC and ITU. The large backbones, preferring self (as opposed to government) regulation of their business responded to the FCC's suggestion that under some circumstances, they would have valid reasons for denying peering to smaller backbones--thus being able to charge them transit fees. Smaller backbones, at that time, saw it in their interest to have industry-wide transparency in peering requirements and hence published theirs to set precedence. Pressure on the large backbones to (i) avoid government regulation, (ii) preempt anti-trust accusations, and (iii) meet the standard of transparency set by an industry newcomers, led many of these players to publish their peering requirements.

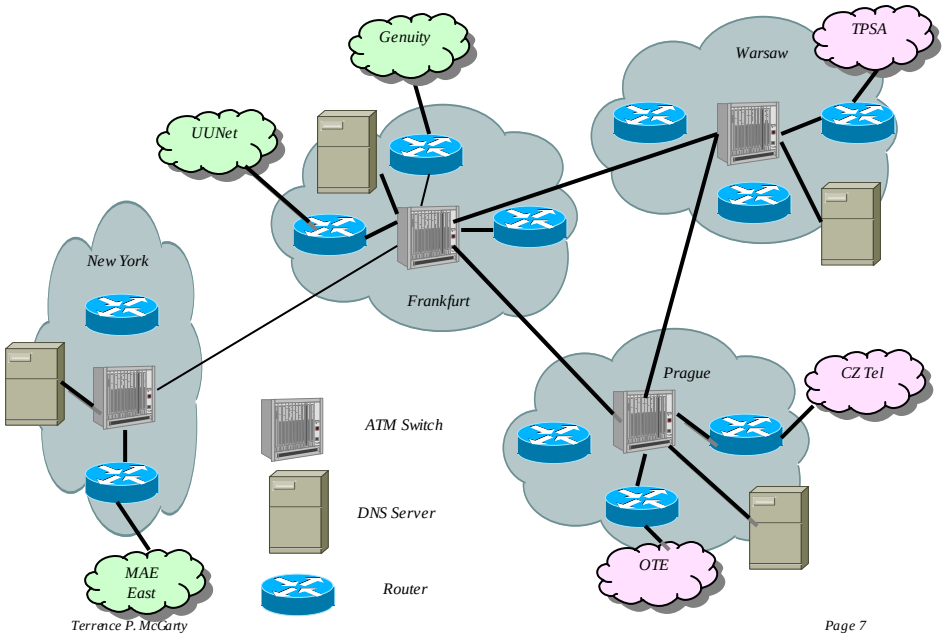
4.3 The Service Infrastructure

This section presents a summary of the structural elements of International Internet interconnectivity focusing on Central Europe. The overall architecture of the backbone network is shown below. It is composed of various access points which are locations for interconnection, peering, transiting, and switching. The network is frequently ATM based to allow virtual IP connections to maximize utilization

[18] Richtel, Matt. 1999. "Small Internet Providers Survive Among the Giants." *New York Times*. August 16, p. D1.

[19] See FCC OPP Report No. 32 issued September, 2000 by the Federal Communication Commission. It details the US regulatory history.

and quality of service, however all IP backbones using MPLS are common. There are six key elements to the overall service: routers, ATM Switches, DNS Servers, backbone networks, External Peering Points, these are peering elements with Genuity, UU Net and other Tier 1 ISPs, Internal Peering Points. These are the peering points for member entities and are for intra network peering. Consider the European market as an example.



The overall architecture of the MAE Europe construct is shown below. It consists of NAPs which are interconnected as a distributed single entity. These NAPs then interface with other NAPs and MAE East and West, as may be required.

4.4 Elements

It is best to start with a set of Definitions:

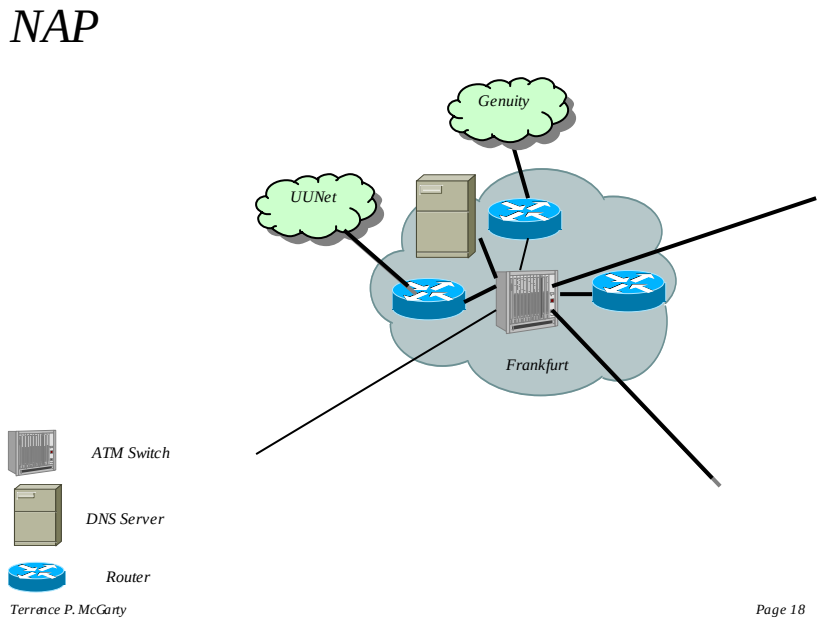
MAE East/West is a point at which multiple Tier 1 ISPs have agreed to interconnect. These points are interconnected by the broadband Internet backbone network. At the MAEs, one in Reston Virginia and on in San Jose California, the Tier 1 Carriers agree to both inter-exchange traffic as well as provide IP address switching facilitation. For a customer on ISP to connect to a provider on ISP 2's network, the two must agree to share addresses and allow interconnection.

Network Access Points (NAPs) are one of several locations where ISPs interconnect their networks. A NAP also includes a route server that supplies each ISP with reachability information from the routing arbiter system.

Domain Name Systems (DNS) are the on-line distributed database systems used to map machine names into IP addresses. DNS servers throughout the connected Internet implement a hierarchical namespace that allows sites freedom in assigning machine names and addresses.

4.5 NAPs

The Network Access Point is an inter/intra country or region point for ISP interconnectivity. A typical example is shown below.



The original system of peering has evolved over time. Initially, most exchange of traffic under peering arrangements took place at the NAPs, as it was efficient for each backbone to interconnect with as many backbones as possible at the same location, as shown in the example in Figure 2. Each backbone must only provide a connection to one point, the NAP, rather than providing individual connections to every other backbone. The rapid growth in Internet traffic soon caused the NAPs to become congested, however, which led to delayed and dropped packets. For instance, Intermedia Business Solutions asserts that at one point packet loss at the Washington, D.C. NAP reached up to 20 percent. As a result, a number of new NAPs have appeared to reduce the amount of traffic flowing through the original NAPs. For example, MFS, now owned by WorldCom, operates a number of NAPs known as Metropolitan Area Exchanges(MAEs), including one of the original NAPs, the Washington, D.C. NAP known as MAE-East, as well as MAE-West in San Jose, and other MAEs in Los Angeles, Dallas, and Chicago.

Another result of the increased congestion at the NAPs has been that many backbones began to interconnect directly with one another. This system has come to be known as *private peering*, as opposed to the public peering that takes place at the NAPs. Backbones *A* and *B* have established a private peering connection through which they bypass the NAP when exchanging traffic for each other, they both only use the NAP when exchanging traffic with backbone *C*. This system developed partly in response to congestion at the NAPs, yet it may often be more cost-effective for the backbones. For instance, if backbones were to interconnect only at NAPs, traffic that originated and terminated in the same city but on different backbones would have to travel to a NAP in a different city or even a different country for exchange. With private peering, in contrast, it can be exchanged within the same city.

This alleviates the strain on the NAPs. At one point it was estimated that 80 percent of Internet traffic was exchanged via private peering. Because each bilateral peering arrangement only allows backbones to exchange traffic destined for each other's customers, backbones need a significant number of peering arrangements in order to gain access to the full Internet. UUNET, for instance, claims to "peer with 75

other ISPs globally." As discussed below, there are few backbones that rely solely on private or public peering to meet their interconnection needs.

The alternative to peering is a transit arrangement between backbones, in which one backbone pays another backbone to deliver traffic between its customers and the customers of other backbones. Transit and peering are differentiated in two main ways. First, in a transit arrangement, one backbone pays another backbone for interconnection, and therefore becomes a wholesale customer of the other backbone. Second, unlike in a peering relationship, with transit, the backbone selling the transit services will route traffic from the transit customer to its peering partners.

Those few large backbones that interconnect solely by peering, and do not need to purchase transit from any other backbones, will be referred to here as *top-tier backbones*. Because of the non-disclosure agreements that cover interconnection between backbones, it is difficult to state with accuracy the number of top-tier backbones; according to one industry participant, there are five: Cable & Wireless, WorldCom, Sprint, AT&T, and Genuity (formerly GTE Internetworking).

In addition, as noted above, transit gives a backbone access to the entire Internet, not just the customers of the peering partner. In order to provide transit customers with access to the entire Internet, the transit provider must either maintain peering arrangements with a number of other backbones or in turn must pay for transit from yet another backbone. In other words, a backbone providing transit services is providing access to a greater array of end users and content than it would as a peer, thereby incurring correspondingly higher costs that are recuperated in the transit payments. In a competitive backbone market, transit prices should reflect costs and should not put entering backbones at a competitive disadvantage.

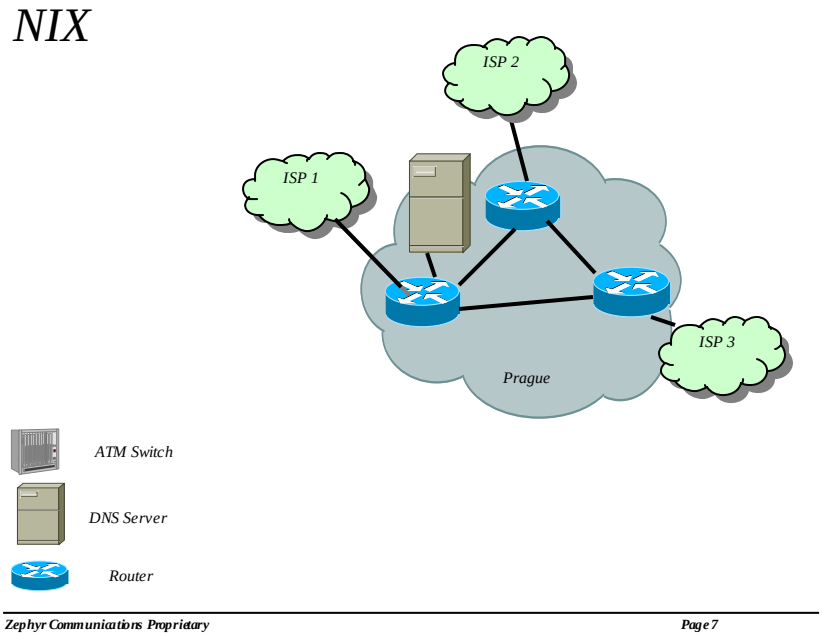
4.6 MAEs

MAE, the Merit Access Exchange, is a peering point of ISPs who then interconnect into the vBNS, the broadband Internet backbone. The MAE in many ways look like a NAP.

ISPs maintain IP networks, connected to the Internet through network access points (NAPs), at key locations currently California, Chicago, Washington, D.C., and New York, or by connecting to other ISPs. NAPs are the entry points to the Internet, where ISPs share information. There are other means of sharing such data between networks, such as the Commercial Interexchange (CIX). Netcom's star-shaped points of presence and telecommunications backbone are centered on the NAPs' hookups. Note that the ISP network is a 45 mbps backbone of T-3s that connect the major points, as well as to the Texas area, where there is no NAP (also see UUNET's backbone network topology in Figure 6.2). Typically, larger ISP networks are cell-switched and framerelay- based. For reliability, ISPs usually depend on more than one interexchange carrier (IXC) to provide time division multiplexing (TDM) point-to-point (or permanent leased line) T-1 and T-3 circuits, which interconnect the POPs. ISPs provide two types of service: leased line and dial-up. We have seen the emergence of another class of ISP, those which interconnect POPs by leasing frame-relay service directly from IXCs, which reduces somewhat the capital an ISP must make to its own network

4.7 NIXs

The NIX, the National Internet Exchanges, is simply a local intra country DNS type facility allowing local ISPs to have interconnectivity. It is shown below in simple form. The NIXs are quite prevalent in Central Europe. They evolved from the academic institutions and generally provide intra-country peering. It is possible to use a Polish ISP and be able to access only Polish web sites and send mail only to Polish subscribers. The ISP has no external connection. The NIX has no connection to the outside world and the ISPs who connect do so only with each other and block any attempts by others to transit.



The NIX concept has exploded in all countries except the U.S. the NIX is a way to disintermediate the Tier 1 ISPs and get around all of the excess costs associated with this type of networking. The NIX artifact is a way all countries except the U.S. manage to enable true broadband deployment with low cost interconnection, namely be mutual peering of any and all traffic. This structure is the second barrier to broadband only in the U.S.

4.8 The Elimination of Transit Costs

As we have shown above the NIX approach represents a way to eliminate transit fees by having the presence of local interconnection. This has been accomplished on almost a global scale in every country except the United States. Perhaps there is a lingering need for internal security measures by forcing all communications onto the Tier 1 backbone networks and then be made accessible to Government agencies or perhaps it is nothing more than an unending need to manage the Tier 1 interface and continue to collect fees.

5. LITIGATION AND DELAY

There has been and continues to be significant litigation by the broadband incumbent which adds to the overall cost of a new entrant as well as the incumbents costs to the deployment of broadband. This section briefly summarizes this litigation efforts over the past few years.

The following Table lists some of the recent litigation. New lawsuits arise each week. The incumbents, especially the cable companies, have taken it upon them selves not only to have a seat at the table of any new entrants franchise negotiations but in addition they frequently threaten litigation to both the new entrant as well as the municipality.

Municipality	*Litigation*
Lafayette, Louisiana	Just one day after promising cooperation and a possible partnership, BellSouth sued to stop Lafayette, Louisiana from pursuing $125 million in revenue bonds to fund a triple-play fiber network .They're the *"proverbial wolf in sheep's clothing,"* argues

	one city leader. With the money BellSouth has spent on fighting the city's effort to get into the broadband business (lobbyists & lawyer fees, PR, etc.), they probably could have wired a significant part of the state, argues locals. See http://www.broadbandreports.com/shownews/59523
UTOPIA, Utah	ILEC **Qwest** has gone to court accusing the **Utah Telecommunications Open Infrastructure Agency** (Utopia) – the $340 million, 14-city fiber-to-the-user project in Utah, of illegally stringing some of its fiber from Qwest-owned telephone poles. It's asking the Utah courts to force Utopia to remove its fiber and to sign a standard contract Qwest demands of anyone using its poles before the fiber goes back up. See: http://www.telecomweb.com/news/1118242986.htm
Tri Cities Illinois *(Geneva, Batavia, and St. Charles)*	Communications companies like Comcast are also taking the local fight to the statehouse and to Congress. Fourteen states, heavily lobbied, have passed restrictions that either encumber municipalities looking to get in the broadband game, or prohibit their involvement outright. Philadelphia, which is launching an ambitious project to cover its entire 135 square miles with cheap wireless access, barely snuck by a 2004 Pennsylvania law prohibiting cities and towns from offering the service without giving the local telephone company a first option. This year the industry is supporting legislation in five more states, and in Washington, D.C., negotiations have begun on a rewrite of the mammoth 1996 Telecommunications Act—another opportunity for lobbyists to push restrictions. See: http://www.motherjones.com/cgi-bin/print_article.pl?url=http://www.motherjones.com/news/dispatch/2005/05/municipal_broadband.html

We have directly experienced this in New Hampshire with the incumbent cable companies and their representatives. In one tow no sooner had we left than the regional VP call the town manager and in less than a veiled way threatened to sue to town for even allowing an competitor.

In another case the representatives of the cable industry litigated to influence the USDA RUS loan process by using the Freedom of Information Act to obtain any and all loan information. The same group alleged that certain information of government filings may have been deliberately falsified, tantamount to saying that a crime was committed. The tactics by the cable incumbents cause additional delay, are costly and frequently are facilitated in an indirect manner by the municipalities. In all cases the municipality invites the cable incumbent to the franchise meetings, provides access to the incumbent of all plans and information provided by the new entrant and frequently the cable incumbent provides the municipality with a list of questions to ask the new entrant thus forcing further transfer of strategic information to the sole benefit of the cable incumbent.

6. CONCLUSIONS

There are many conclusions which can be determined from this study. We first focus on the most critical area, franchising.

6.1 Franchise Recommendations

Franchising has multiple failures in the current environment of broadband. Several of these based upon our actual case experience are as follows:

1. Franchise Time to Market is Excessive: The length of time to obtain a franchise is excessive. Each municipality has separate negotiations, separate needs separate meeting of selectmen and town members and there is generally little if any consistency. The time between meetings is excessive and the amount of human resources is also excessive.

2. Franchise Cost to Market is Excessive: The costs incurred in the franchise process are excessive. The amount to a hidden tax on the system design frequently adding 25%-45% added cost per subscriber above the infrastructure costs. In addition these are hidden costs and cannot be capitalized. They create a significant burden on any new entrant into a market.

3. Franchises Control Technology and the Franchise becomes a Disincentive to Innovation: Franchises dictate what technology should or must be used where in the system. As we have demonstrated, wireless may blend economically with fiber. But the municipality controls only fiber and they then dictate what design using fiber must be made and thus push out any option of a wireless system integration.

4. Franchises Not Applicable to IP Networks: IP is an open network element. IP is the basis of the Internet and as such is the key elements in keeping the Internet open and accessible for its enormous growth potential. Franchises are inherently a controlling process with no standards. Thus each time one enters into a franchise new controlling elements are introduced and these violently conflict with IP. The local municipality are technically not competent and they may rely upon technical advisory groups, hidden from the new entrant, who may have their own agenda. These groups may have competitors as part, and thus may demand certain technical factors which reduce the competitive nature of the new entrants services and other grossly anti competitive demands. The essence of IP was and till is openness. It means de minimis regulation, and hopefully none.

5. Franchises not Applicable to Open Networks: Open networks mean that any potential provider of content, video or whatever, can have access to the network and in turn can become the purveyor. This is one of the many ways in which the OVS concept provides maximum flexibility. The users in an open network fabric do not even have to identify themselves to anyone and the transactions are between these users and the users of the network at large. Franchises inherently assume a hierarchical central control of everything, transport, content, and charging. This is not the case with the Internet as a whole and it is certainly not the case in a open network IP based broadband system. Thus the basic assumptions of franchising if applied to broadband are not only flawed but become counter-productive.

6. Franchise Processes are Inherently Unfair and Unbalanced: We have seen repeatedly the cable incumbent having a seat at the negotiating table, indirectly, but clearly present. They demand and the town responds with higher hurdles for a new entrant. For example, we have seen the demand for larger coverage areas, shorter durations, increased reporting, more data to be provided, increased institutional and PEG requirements and other similar increased demands from the municipalities.

7. Franchise Processes Establish an Un-even Playing Field: The franchise as we have demonstrated by the cases discussed, establish a continuing raising of the bar. The municipality view each new franchise as another bite at the apple. The incumbent views this as a way to disincentive the new entrants and establish a barrier to entry. All existing arties try to obtain new concessions. This process will ultimately result in a totally uneconomical market for any new entrant. It clearly is a direct disincentive to invest.

8. Local Authorities Want Long Term Control Over Architectures, Services, Technology, and Systems: The franchise on one had is looked at as a short term agreement, in some case as short as five years but on the other hand as a long term control mechanism. The long term control forces decisions on technology which are frequently counterintuitive to the market.

As a result of these many observations of the current franchise process and the analysis performed above, all based upon actual experience with current franchising systems, there are several recommendations which can be made. These are as follows:

1. IP Video should be considered as an Information Service not video:

2. Franchise Fees, Taxes, and other fees placed upon IP Video Distributors should be eliminated since they impact directly on technical implementations and do not properly reflect the evolving business models:

3. Regulation of IP Services should be minimal to non-existent consistent with how the Internet was let to evolve. Any regulation of IP services will result in market and technology distortions and reduce growth potential: IP is an open capability end enabling technology for the Internet. Regulation of IP is counterproductive. If any service migrates to IP then it should be unregulated.

4. If there is a rewrite of the Telecommunications Act, the status of IP services, whether video, voice or any other, should be clearly established as a non-regulated or non-regulatable information service: The last rewrite of the Telecommunications Act in 1996 was predicated on then already decade old technology. In the middle of the explosive growth of the Internet at the time of that re-write, it failed to account for any future growth and was very backward looking. Hopefully a forward looking rewrite will result this time. Key to that is the unbundling of any and all broadband elements and the establishment of a true level playing field. The restrictions of the current act and releases from these restrictions from the incumbents relate only to the existing copper pair paradigm. Broadband should be established on an open and level playing field basis.

5. Additional items such as rights of way and pole attachments must be opened up at fair and reasonable prices: All entrants should face an open and level playing field. This should include the pole attachment rights. This of course could present a problem is available space but with the fair balanced and even handed approach, stipulated at the Federal level, this can be achieved. Local pole rights of way will create chaos in both the long and short term.

6. Municipalities, if they desire to provide their own infrastructure, must do so at arms length and with a level playing field of costs: Municipalities have recently been getting into the field of developing their own infrastructure. The problems they can create an multiple. The have argued that they do not need franchises. This is the first unfair advantage. They then try to use municipal space on poles then having not to pay pole attachment fees. A second unfair advantage. They also have no requirements on franchising in excess of what they desire to do. Clearly if a municipality wants to do the deployment of broadband, then at a minimum they should do so via a separate arm length entity to prevent cross subsidizing, and in addition should face the same costs structure from fees and requirements as any other entrant. This includes compliance with all laws and taxations and fees.

6.2 Recommendations in the Telecom Rewrite to Support Broadband

It seems clear that there will be a modification to the Telecommunications Act of 1996. The reasons are manifest; primarily the drivers of the Internet, wireless, and broadband are the major factors. The industry has changed dramatically in less than ten years. Competition, which at that time seemed almost a foregone conclusion has almost disappeared. The industry is coalescing again into a pre-1982 world of a single of few dominant carriers. However, the new technologies are growing in the world around us but not in the United States.[20]

The goals of the 1996 rewrite were not only not achieved, the anticipation of them resulted in one of the largest collapses of the equity markets globally. Investment by new entrants anticipating a truly open market led to investment of trillions in high yield non-secured debt and equal amounts in vendor financing. The result was a multi trillion dollar collapse of the stock markets world wide. This was highly anticipated

[20] See McGarty, T.P., Alternative Networking Architectures; Pricing, Policy, and Competition, Information Infrastructures for the 1990s, John F. Kennedy School of Government, Harvard University, November, 1990. or Alternative Networking Architectures, B. Kahin Editor, McGraw-Hill (New York), October, 1991. These two papers were written almost fifteen years ago when the author was at MIT and at NYNEX. The reflect an view of open distributed networks built around an IP fabric. At that time the concept was the NREN, a national educational network. That network became what we now see as the Internet.

as early as mid 1999, with the excessive high yield debts and vendor commitments, based on an assumption of an open telecommunications market.[21] This open market did not occur. The FCC failed in its role, the Courts in the US over-ruled any attempts by the FCC and others to even try, and the incumbents practiced to a finesse the art of "delay being the deadliest form of denial". This paper outlines the key elements which must be addressed in the next rewrite of any telecommunications act. Failure to do so by Congress will result in a even more serious set of failures than those which they instigated in 1996.

6.2.1 Eliminate Access and Interconnection Fees

Access or interconnection fees are the fees that the incumbents charge anyone else to connect to their network. Economists in their wisdom have justified these based on the ad hoc propiter hoc theory of network externalities. Simply stated, they argue that since the incumbent have more wireline customers that any other player they bring value to the interconnection which demands compensation. Well since January 2004 there are more wireless access lines than wireline and following the reasoning of the economists we should immediately switch this fee structure.

We have argued extensively elsewhere that the basis establishment of any access or interconnection fee is anti-competitive and favors the incumbent.[22] True competition should be based on true costs reflected in true prices. By having no such fees we allow the market to efficiently clear itself of inefficient producers and products.

Recommendation: The total elimination of access and/or interconnection fees. The requirement for any and all networks to interconnect to peers at no cost.

6.2.2 Eliminate Franchise Requirements

Franchises are the largest single hidden cost for the deployment of broadband in the United Sates. Franchise are also the single major reason why the United States is lagging behind other countries in the deployment of broadband. There are over 30,000 franchising entities in the US, towns, cities, counties, and a few states. Each requires their own "pound of flesh" in a long and drawn out process.[23] In fact, it has been shown that the Franchise process can add up to $800 per subscriber in additional up front costs.

Thus the Franchise process must by necessity be dramatically changed. It may be eliminated if the FCC were to rule that IP video were an information service and further that it allow any IP video provider to enter the broadband market without a franchise.

[21] See McGarty, T.P. Comparative Deregulation of Far Eastern Telecommunications Markets, Telecommunications Policy Research Conference, Washington, DC, September 28-30, 1997. and The Imminent Collapse of the Telecommunications Industry, MIT ITC Working Paper, August, 2002. The latter of these two papers was prepared at the request of staff at the Executive Office of the President in the summer of 2002. The general conclusions were that the incumbents were in trouble with their current business model. It also predicted the dominance of wireless access lines a fait accompli.

[22] See McGarty, T.P., Economic Structural Analysis of Wireless Communications Systems, Advanced Telecommunications Institute Policy Paper, Carnegie Mellon University, February, 1993.; Access to the Local Loop; Options, Evolution and Policy Implications, Kennedy School of Government, Harvard University, Infrastructures in Massachusetts, March, 1993.; Wireless Access to the Local Loop, MIT Universal Personal Communications Symposium, March, 1993.; Access Policy and the Changing Telecommunications Infrastructures, Telecommunications Policy Research Conference, Solomon's Island, MD, September, 1993. The author more than ten years ago was pressing for the total elimination of interconnection. The author argued that the concepts that led to justifying interconnection and access fees was an ad hoc propiter hoc argument based on fallacious assumptions. These assumptions if propagated into the current market would change the access fees around and force payment from wireline to wireless. This is also an absurd conclusion. This is an antinomy, a proposition all of whose conclusions are false. The only conclusion is no fee at all.

[23] See McGarty, T.P., Franchises, the Hidden Cost of Broadband, Telmarc Report January 2005. The author is currently obtaining franchises in dozens of small towns and cities, Twenty five years ago the author as an office or the then Warner Cable did the same in over a dozen large cities. The conclusions of this paper are based upon actual and now current case studies. They show indeed that Franchise are the single most severs deterrent to broadband deployment in the US.

Recommendation: The Franchise process must be dramatically changed. One solution is to move it to the state level from the local level. It would make it parallel to the PUC approach with telecommunications services.

6.2.3 Eliminate the Control of Media Content and Allow Broader Distribution of Content over IP Based Technologies

Media content is the last bastion of control over the video market.[24] If video content is to be the cornerstone of broadband deployment, and if broadband deployment will eventually rely of technological expansions with IP capabilities, then the media content owners must not be permitted to block distribution of their products by red-lining new entrants because of technology. For example, consortia such as NCTC, controlled by the incumbent large media companies, disallow members who have either an open video system franchise or who use IP video. The reason for this is to maintain their related partners control over the market. This means that new and innovative entrants cannot gain parity in a new media market.

Recommendation: That media content providers shall not be allowed to discriminate amongst distributors of content on the basis of their regulatory or technological status.

6.2.4 Eliminate Right of Way Limitations

Broadband and wireless require access to the public rights of way. The 1996 Act established some additional flexibility to rights of way but these have not been satisfactory. The Incumbents and the municipalities are all in some form controllers and delayers of this process. There are local, state and federal issues, there are delays resulting from the inefficiencies of the Incumbent, and there are delays resulting from the local municipalities again wanting a piece of the action. If broadband and wireless will ever have a chance this process must be rationalized now.

Recommendation: The right of way process must be dramatically changed. State PUCs must be given more authority to remedy delays, costs overages, or other anti-competitive measure taken by incumbents to delay entry by new competitors.

6.2.5 Open Access

Open Access is a key to the effective deployment of broadband.[25] Open access have two connotations; first, open to any user who seeks to use it as a service delivery means, second, open from a technological set of standards. Broadband is a roadway to access to services, it is a means to an end and not the end in itself. It is like a highway, and one should be able to operate cars, truck, and any form of safe and reasonable motor vehicle service upon the highway. Broadband is that highway and openness is a key to its effective deployment.

Recommendation: Congress must require that all broadband providers must provide both open networks to purveyors of broadband services and open access in terms of technological interfaces.

6.2.6 Establish a Process at the FCC for Spectrum Re-allocation and Usage by Means of Advanced Technological Spectrum Sharing

The largest set of problems that the FCC faced in the past thirty years has been the fiascos over the allocation of spectrum. The FCC's approach was in the initial allocation of cellular spectrum to provide it on the basis of a random draw at no costs. All one had to do was to apply, then if the luck of the draw was with you, you got the spectrum and then sold it to the highest bidder, making you an instant millionaire. The FCC's second approach with the instigation of Congress was the auctions, and the worst of those

[24] See McGarty, T.P., The Impact of Broadband Options on the Disaggregation of the Media Industry, September, 2004, Telmarc Working Paper.

[25] See McGarty, T.P., Municipal Broadband Networks, A Local Paradigm, September, 2004, Telmarc Working Paper.

auctions was the C Band small business, minority, women etc auction. The biggest winner was Nextwave, backed by Pohang Steel, Korea's largest steel manufacturer, and other such "small businesses and minorities" Even with that backing Nextwave went bankrupt, BUT never lost the spectrum. It took more than ten years and a Supreme Court decision to make the bankrupt company again rich.

Is this a way to allocate spectrum at a time when technology can really be more efficient. Just look at the unlicensed band for WiFi, such as 802.11 systems, and what we see is tremendous growth, simplicity of access, and falling costs of entry. The question then is why not let technology take a chance at allocation spectrum. This has been proposed many years ago and has substantial merit.[26]

Recommendation: The FCC change its antiquidated means of spectrum allocation and establish innovative means and methods to share spectrum without the need for the costly and time consuming auction process. This means the use of higher power capabilities in shared spectrum with the options of real time sharing.

6.2.7 Revise and restructure Universal Service

Universal service has been an added tax to the telecommunications market and has been a thorn in the side of policy makers as they look at the deployment of such new services as VOIP. Universal service itself is questionable as currently deployed and has been addressed extensively.[27]

Recommendation: The Congress must change the overall concept of Universal Service. Currently this is a tax redistribution system which is not effectively working. If the Congress wants to redistribute wealth to those not as fortunate then they should do so expressly and not allow the incumbent to be the tax collector and ineffectively redistribute the funds collected.

6.2.8 Liberalize and Federalize Taxation Issues

The major element in delaying broadband has been the franchise and the franchise is a local process with a local tax collecting capabilities. In addition states have taxing authority on various telecommunications services but have been delimited on taxing Internet related services.

Recommendation: Congress must establish some rationalization of the taxing process. Taxing at the municipal level is much too complex, and at the state level is too inconsistent.

6.2.9 Deregulate Broadband

Broadband must be totally deregulated. The FCC has made rules in that direction and it appears that this will continue. The incumbents as well as new entrants should be allowed a level playing field. If anyone is to invest in broadband it must be with de minimis regulation; federal, state and local. Regulation as we have seen always distorts the market. Interfaces should be open, interconnection should be open, and interconnectivity should be open. IP based networks are the key to this capability. In effect it is the local expansion of the Internet.

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[26] See McGarty, T.P., and M. Medard, Wireless Architectural Alternatives: Current Economic Valuations versus Broadband Options, The Gilder Conjectures; Solomon's Island, MD, September, 1994. The author and Prof. Medard first prepared this study more than ten years ago to show that there are technological means to deploy bandwidth in an efficient and economical fashion. Since that time, Prof. Medard ahs performed significant and groundbreaking work at MIT and has published extensively on this topic as well as having obtained over a dozen patent describing actual implementations. Recently other approaches such as wireless grids have further expanded this potential. The FCC approach is based on a century old methodology to spectrum management, akin to Marconi's spark communicator. We are seeking that the FCC skip the 20th Century and rapidly get into the 21st.

[27] See McGarty, T.P., The Economic Viability of Wireless Local Loop, and its Impact on Universal Service, Columbia University CITI seminar on "The Role of Wireless Communications in Delivering Universal Service", October 30, 1996.; and The Economic Viability of Wireless Local Loop, and its Impact on Universal Service, *Telecommunications Policy*, Elsevier (London), 1997. In these two papers the author argues for a dramatic restructuring of Universal service. The concept in a broadband world no longer makes sense.

Recommendation: The FCC and Congress must take all steps to totally deregulate broadband if this is provided by the means of the deployment of new facilities.

6.2.10 Provide and Ensure for a "Level Playing Field" for all local markets allowing for total parity amongst all players or entrants, both commercial and municipal networks.

There has been a great push for municipal broadband and just as great a push back. Any provider should have equal chance on an equal playing field. Municipals should not be kept out but at the same time they should not be preferentially treated. Municipals, since they control the franchise process, if they desire to enter must do so via a separate arms length subsidiary. This law has been proposed in New Hampshire but strongly opposed by the Municipal Association. The Association demanded preferential treatment while at the same time extracting predatory rates and services from non municipal competitors. This creates not only a non-level playing field but a hostile and intimidating environment.

Recommendation: Congress should allow municipals to enter the broadband market but only through separate and arms length entities which must meet all the statutory and regulatory demands of any other entrant.

6.2.11 Expand the scope of Information Services to Include all Broadband and Related IP Elements

Information services as defined by the Act has expanded in scope over the past few years. The classification of cable modems and VOIP has made information services as the classification most appropriate for any element which is broadband or IP related. Expansion of this to IP video for example is also essential. VOIP for example has been determined that it be an information's service. This has taken over eight years by the FCC to reach what is an obvious point to most event at that period of time.[28]

Recommendation: Keep the classification of telecommunications services to the classic wireline provisioning and video services to the classic analog provisioning. Allow any and all other services especially those using IP should be considered as information services and thus be unregulated by any entity.

6.2.12 Allow any entity to compete in broadband; enable municipals to do so at arms length

Municipalities have recently been allowed to fall to some third order citizenship.[29] The Supreme Court recently ruled that municipalities have no status as entities and thus do not deserve the rights that entities have under the 1996 Telecommunications Act. Municipalities can build roads, sewers, power distribution networks, gas and other basic facilities but they cannot build broadband infrastructure. In an extreme case in the state of Pennsylvania, the recent laws band municipalities unless and until they receive permission from Verizon! This is the extreme of privatizing government. Municipalities should have the right, because it means the people have the right. However the right should be consonant with their abilities in these other areas. Specifically three key element should be incorporated; it should be done in separate subsidiaries, it should be done with a basic concept of a level playing field, namely that they pay market rates as any other competitor, and that whatever they provide as a broadband pipe is done in an open manner, open to users and open using commonly accepted technology, most likely IP based technology.

[28] See McGarty, T.P., Internet Voice: Regulatory and Legal Implications, Presented at the VocalTec Seminar on September 9, 1996, New York, NY.; Economic Factors on International Internet/Intranet Telecommunications, MIT Research Program on Communications Policy Conference Internet Telephony Interoperability Forum, Bristol, England, June 11, 1997; The Application of IP Telephony to Local Exchange Carriers, MIT, Internet Telephony Consortium, March, 1999.; Internet Telephony Markets and Services, in Internet Telephony, MIT Press (Cambridge), 2001.

[29] See the recent decision by the US Supreme Court; 541 US ___ NIXON, ATTORNEY GENERAL OF MISSOURI *v.* MISSOURI MUNICIPAL LEAGUE *et al.* certiorari to the united states court of appeals for the eighth circuit No. 02-1238. Argued January 12, 2004--Decided March 24, 2004.

Recommendation: Allow, by express statement of Congress, any "entity", including any and all municipalities to provide broadband infrastructure provided that they do so in a separate subsidiary, operating at arms length and providing a fully open network.[30]

6.2.13 Expand the ability to seek remedies by harmed third parties from dominant incumbents

The FCC has not been the only methods of seeking remedies envisioned by the Congress. The 1996 Act released the ILECs from protection from Antitrust suits for example.[31] The only entity allowed such protection is now professional baseball.[32] However, the Courts in interpreting how to allow parties to seek remedies have severely limited the ability of aggrieved parties to obtain such relief due, they say, to the ambiguity in the law. The law must be made less ambiguous and the Courts must have no room to second guess the Congress. Third parties must have the options to seek their remedies through the courts, not just administrative remedies through an overloaded FCC.

Recommendation: Congress shall expressly amend the antitrust legislation allowing third parties who have been harmed by anti-competitive actions to seek remedies as any other party.

6.2.14 Open and Fair Access to the Internet Backbone: The Elimination of the Cartels

There are five entities who control access to the Internet, they are called Tier 1 ISPs.[33] They control the destiny of the Internet as a viable medium. For example, to connect to other users of the Internet one must "transit" or peer with one or all of these players. They charge prices which are reflective of "what the market will bear" and not reflective of any costs to them. For example, one can connect in Hanover, NH at a price point of $400 per Mbps per month. In Frankfurt, Germany the rate may be $12 per Mbps per month, due to much greater volume. Does this mean that people in Central Europe are getting a better deal than those in central New Hampshire? The answer is yes, but at this point no one notices. However, if I want to look at an HDTV video, say 6 hours a day in my home over the Internet, this would cost $2,000 per month just for the transit fee for that one user![34] This is a clear and present danger for true Internet utility. We have detailed this in previous papers.[35]

Recommendation: The rationalization of pricing for peering connections with the FCC having the authority to establish market based rates.

6.2.15 Privacy of Broadband Must be Preserved and Protected

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[30] Note that this follows the recent New Hampshire Legislative approach as compared to the Wisconsin, Florida, or Pennsylvania approach. The New Hampshire approach is a positive and not a restrictive approach. The Pennsylvania approach goes so far as to require any municipality to get the permission of Verizon!

[31] See Verizon vs. Trinko, US Supreme Court, Argued October 14, 2003—Decided January 13, 2004.

[32] See McGarty, T.P., Current Telecommunications Legal Issues, Litigation v. Legislation: Is the 1996 Act a Beginning or an End?, MIT ITC Working Paper, December 2002.; Competition in the Local Exchange Market: An Economic and Antitrust Perspective, *Federal Communications Law Journal*, submitted 1996.

[33] They are UUNet, Level3, ATT, MSN, and X

[34] Foe example, an HDTV is 20 Mbps and for 6 hours per day, that is 25% of the time, and for $400 per Mbps this yields; 20 X 25% X $400 which is $2,000 per month.

[35] See McGarty, T.P., Internet Architectural and Policy Implications, Kennedy School of Government, Harvard University, Public Access to the Internet, May 26, 1993.; From High End User to New User: A New Internet Paradigm, McGraw Hill (New York), 1995.; Peering, Transit, Interconnection: Internet Access In Central Europe, MIT Internet Consortium, January 2002. The author prepared these papers while at the same time having founded and run the largest fiber backbone network in Central Europe. In that network the author was paying a Tier 1 carrier the rate of $12 per Mbps per month FOB Frankfurt, Germany. In the authors current endeavors of deploying FTTU in New England the rate is $400 per Mbps per month in that region. The Central Europeans have Internet backbone access at almost one fortieth of that of US citizens. That is the "crime" of the oligopoly of the Internet control at Tier 1.

Privacy has come under stress with the post 9/11 Patriot Act. However there are fundamental issue regarding privacy which Congress must imbed within any new Telecommunications Act. These are nothing more than what we have come to expect as a result of our inherent Constitutional protections.[36] This means that there should be clear and unambiguous statement of what the rights are and how they can be protected. In addition clear remedies for violations must be articulated.

Recommendation: The revised Telecommunications Act must expand the issues of privacy to encompass not just cable and telephony but all broadband issues. This must include not only protection of improper intrusion but also an expansion into the ability to protect from third party intrusions such as SPAM and other similar areas.

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8. EXHIBIT 1: NEW HAMPSHIRE LAW

TITLE III
TOWNS, CITIES, VILLAGE DISTRICTS, AND UNINCORPORATED PLACES
CHAPTER 53-C
FRANCHISING AND REGULATION OF CABLE TELEVISION SYSTEMS BY CITIES AND TOWNS

Section 53-C:1

53-C:1 Definitions. – In this chapter:

I. "Cable television system' means facilities by which television signals are received at a central location and for consideration are transmitted to customers or subscribers by means of cables or wires.

II. "Company' means any person, partnership, association, or corporation, including a municipality, owning or operating a cable television system, except for any nonprofit system serving fewer than 100 subscribers.

III. "Franchise' means an initial or renewed authorization issued by a franchising authority to construct or operate a cable system.

IV. "Franchising authority' means any governmental entity empowered by federal, state, or local law to grant a franchise.

V. "Master antenna television system' means a cable television system which serves only the residents of one or more apartment dwellings under common ownership, control or management, and any commercial establishment located on the premises of such apartment house and which transmits only signals broadcast over the air by stations which may be viewed normally or heard locally without objectionable interference, and which does not provide any additional service over its facilities.

VI. "Municipality' means a city or town.

Source. 1974, 23:1. 1989, 338:1, eff. Aug. 1, 1989.

Section 53-C:2

53-C:2 Franchise Required. –

I. No company shall construct, commence construction, or operate a cable television system in any municipality without first obtaining a written franchise from the franchising authority of each municipality in which such system is installed or to be installed.

II. Nothing in this chapter shall prevent municipalities from cooperating to jointly exercise franchising authority in accordance with RSA 53-A.

Source. 1974, 23:1. 1989, 338:2. 1996, 72:1, eff. July 12, 1996.

Section 53-C:3

53-C:3 Authority to Grant Franchises. – Municipalities are hereby authorized to grant, renew, amend or rescind for cause franchises for the installation and operation of cable television systems in accordance with the provisions of this chapter within the geographical limits of its respective town or city.

Source. 1974, 23:1. 1996, 72:2, eff. July 12, 1996.

Section 53-C:3-a

53-C:3-a Franchise Applicant Considerations. – No municipality shall grant a franchise for cable service to a cable system within its jurisdiction without first, at a duly noticed public hearing, having considered:

I. The financial ability of the franchise applicant to perform.

II. The ability of the applicant to provide adequate and technically sound facilities, equipment and signal quality.

III. Adequate channel capacity and appropriate facilities for public, educational, or governmental use, taking into account available technology, subscriber interest, and cost.

IV. The prohibition of discrimination among customers of basic service.

V. Reasonable service quality in terms of available technology, subscriber interest, and cost.

VI. Construction and installation which conforms to all applicable state and federal laws and regulations and the National Electric Safety Code.

VII. A competent staff able to provide prompt, adequate service and to respond comprehensively to

customer complaints or problems.

VIII. Reasonable rules and policies for line extensions and disconnects, customer deposits, and billing practices.

Source. 1989, 338:3, eff. Aug. 1, 1989.

Section 53-C:3-b

53-C:3-b Franchises; Administration by Municipality. –

I. All franchises shall be nonexclusive. No municipality shall grant any additional franchises to cable service within its jurisdiction on terms or conditions more favorable or less burdensome than those in any existing franchise within such municipality.

II. Nothing in this section shall be construed to prevent any municipality considering the approval of an additional cable service franchise in all or any part of the area of such municipality from imposing additional terms and conditions upon the granting of such franchises as such municipality shall in its sole discretion deem necessary or appropriate.

III. All cable service franchises in existence as of May 1, 1989, shall remain in full force and effect according to their existing terms.

Source. 1989, 338:3, eff. Aug. 1, 1989.

Section 53-C:3-c

53-C:3-c Credits and Refunds for Interruption of Service. – Every franchisee shall agree to the following:

I. In the event its service to any subscriber is interrupted for 24 or more consecutive hours, it will, upon request, grant such subscriber a pro rata credit or rebate.

II. It will maintain an office which shall be open during usual business hours, have a listed toll-free telephone number, and be capable of receiving complaints, requests for adjustments, and service calls.

Source. 1989, 338:3, eff. Aug. 1, 1989.

Section 53-C:3-d

53-C:3-d Notice to Subscribers Regarding Quality of Service. –

I. Annually, every cable television system operator shall mail to each of its subscribers a notice which:

(a) Informs subscribers how to communicate their views to the cable company and to the office of the attorney general, consumer protection and antitrust bureau;

(b) States the responsibility of the office of the attorney general, consumer protection and antitrust bureau to receive and act on consumer complaints.

II. Such notice shall be in nontechnical language, understandable by the general public, and in a convenient format. On or before January 30 of each year, the operator shall certify to the franchising authority and to the office of the attorney general, consumer protection and antitrust bureau that it has distributed the notice as provided in this section during the previous calendar year as required by this section.

Source. 1989, 338:3, eff. Aug. 1, 1989.

Section 53-C:3-e

53-C:3-e Recording of Subscriber Complaints. –

I. Every cable television system operator shall keep a record or log of all written complaints received regarding quality of service, equipment malfunctions, billing procedure, employee relations with customers and similar matters. Such records shall be maintained for a period of 2 years.

II. Such record shall contain the following information for each complaint received:

(a) Date, time, nature of complaint;

(b) Name, address, telephone number of complainant;

(c) Investigation of complaint;

(d) Manner and time of resolution of complaint; and

(e) If the complaint regards equipment malfunction or the quality of reception, a report indicating corrective steps taken, with the nature of the problem stated. Every cable television system operator shall make the logs or records, or both, of such complaints available to any authorized agent of the franchising authority upon request during normal business hours for on-sight review.

Source. 1989, 338:3, eff. Aug. 1, 1989.

Section 53-C:3-f

53-C:3-f Franchise Document Clearing House. – Within 60 days of the granting of an initial franchise and any renewal of such franchise, the franchisee shall file a copy of the franchise and any Federal Communications Commission rulings or other rulings affecting such franchisee with the secretary of state. Within 60 days of June 2, 1989 cable system operators shall file a copy of their existing franchise with the secretary of state. The secretary of state shall maintain a file of all franchise documents so recorded and make copies available upon request for the cost of reproduction and mailing, plus a reasonable administrative fee. The filing fee for initial and renewal franchise documents shall be $50 per franchise or renewal of such franchise. In years in which the filing of initial or renewal franchise documents is not required, the franchisee shall pay to the secretary of state a fee of $50 for each locality served by the franchise.
Source. 1989, 338:3, eff. Aug. 1, 1989.
Section 53-C:3-g

53-C:3-g Rights of Individuals. – No cable television system operator shall deny service, deny access, or otherwise discriminate against subscribers, channel users, or any other citizens on the basis of age, race, religion, sex, physical disability, or country of natural origin.
Source. 1989, 338:3. 1990, 140:2, XI, eff. June 18, 1990.
Section 53-C:4

53-C:4 Authority to Establish Fees and Impose Conditions. – In conjunction with the rights granted in said franchises, any franchising authority may require reasonable fees payable to the municipality and may impose conditions not inconsistent with applicable Rules and Regulations of the Federal Communications Commission, as amended from time to time.
Source. 1974, 23:1, eff. April 2, 1974.

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