The Imminent Collapse of the Telecommunications Industry?[1]

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Abstract

The Telecommunications industry in the United States is on the verge of collapse. The fundamentals are flawed, policy is confused, the Courts are fumbling in interpreting and applying the law, and the consumer, but more importantly national security is being placed in jeopardy. All the while, the Government is focusing on one of the symptoms, corrupt management, when the other symptoms go overlooked and the disease spreads rampantly throughout the body. This paper outlines the symptoms, argues the causes, tries to diagnose the disease and finally suggests some first steps to stop the progression. This is a rare case of time being of the essence for intelligent and forthright government intervention, intervention based on facts, experience, and an understanding of what works and what does not.

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[2] This paper represents the opinions of the author and does not reflect the views or opinions of the Merton Group.

1 INTRODUCTION

Where is the telecommunications industry going and should the government really care. Is the hand of Adam Smith's world really taking care of everything or is there some other malignant process at foot. Where would one go to determine this. If a government official wanted to understand wither goest he? To the business community, say talk with Bernie Ebbers, possibly Gary Winnick, or maybe Annuziata or Anschutz. Or better yet, an independent analyst, say Grubman of Citi's Solomon Smith Barney? Any rational individual would say n o. The problem is that one does not have a reliable information broker who can provide an assessment. But where do our government officials go, to these sources, and the risk of bad policy becomes pandemic. We argue herein that there are many issues which are structural, which are at the control of the government, in fact the making of the government, which are the primal causes of the current collapse. In fact we further argue that without immediate understanding of the business the collapse will become pandemic across all of the industry, that there may very well be no one left standing, despite what the Grubman's were predicting, there is no standing "buy" order.

The issues that we discuss here are the understanding structural issues regarding the business elements, their interconnectivity, and the potential for industry melt down. Certain parts of the business are supporting other parts. Thus, the wireline business looks better than it is based upon the wireless. However, the dynamics of the business are even more important. Dynamics mean that the changes in customer base, pricing, alternatives, make it uncertain that the stability issues will be well understood. This paper is an attempt to demonstrate the sophisticate interconnections in this industry.

We know that PSI has gone bankrupt, one of the first Internet backbone companies. The next anticipated bankruptcy is Genuity.[3] There is concern about UUNet because of the WorldCom bankruptcy. The question then can be put, is there a set of fundamental institutional flaws which will cause this bankruptcy? This paper looks first at that and we will expand into the ILECs, the ILD carriers, CATV carriers, and others.

1.1 Interlinking Structures: A Problem of Stability

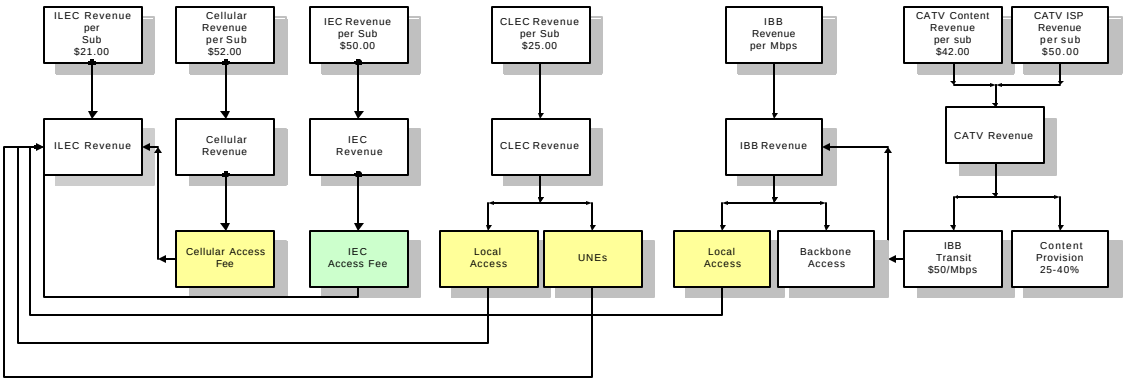
The following Figure depicts some of the key linkages between the six elements of the market. These elements are; (i) the RBOCs or ILECs, (ii) cellular providers, (iii) IEC or long distance companies, (iv) CLECs, (v) IBB or Internet Backbone Providers such as UUNet or Genuity, and (vi) CATV companies.

The key observation is that so many contribute to the ILEC and so few anywhere else. This will become evident when analyzing the Verizon viability long term. In addition, this model, simple as it may be, shows that there are significant feedback loops in the business, loops that are well know, loops with delays, and as we know, such systems have significant tendencies to instability. This is a topic which itself need further analysis.

The model below reflects some of the interdependencies of the telecom market, especially the flows back to the ILECs, all generated by regulatory mandates. In this paper we will present a simple but generally broad model showing telecom competition between players and show how if the players compete on price and have a constraint of cash then there is a stability point. If, however, the players compete on price but one player controls cost elements, the system is inherently unstable. The approach we use is the dynamics and dynamic models of businesses, and we avoid the complexities of microeconomic models which focus on details which do not come to play. We deal with dynamic systems and look at their inherent stabilities and instabilities.[4]

[3] Certain commentators have stated that the PSI bankruptcy was a good thing because it showed how robust the Internet was. Another view is that of a physician, where the patient lives after the first heart attack and the physicians concern is that this is a harbinger of things to come and something must be done. I share the latter school, that PSI was the first of possibly many and we must examine the causes and seek remedies not praise our selves on the robustness of the body to withstand a myocardial infarction.

[4] See McGarty, Stochastic Systems and State Estimation, Wiley 1974.



The key observations in the above flow are as follows:

1. The ILEC/RBOC collects substantial revenue, in our analysis enough to create substantial operating losses if they are removed, from four of its immediate peers in the overall telecommunications industry. Most of those peers are now in financial difficulty.

2. The revenue that the RBOC collects comes from regulatory machinations that pre dates any telecommunications reform, namely the access fees.

3. UNEs have been argued to be under-priced by the RBOCs but over priced by the CLECs. The CLECs, in this case we include DSL players, pay a disproportionate share of the total costs of the RBOC, given that CLECs have not more than 10% of the total market.

4. The telecommunications infrastructure and financial relationships are readily analyzed and it is the interdependencies created by regulation that led to the instabilities in the system. These can be remedied but time and true attempts a de-regulation are critical.

5. Failure to remedy these regulatory instabilities will ultimately lead to a collapse of this infrastructure.

We can further extend this understanding of the integrated nature of the telecommunications business by looking one level down at the CLEC. Take three elements; revenue, cost of service, and cost of sales. In these three elements we can see the influence of the ILEC.

Consider the following simple example:

(i) Revenue for a CLEC is determined in many ways by the price set by the ILEC. The CLEC must meet or beat this price since the product is fundamentally a commodity. This fact makes an analysis of this industry fairly straightforward. Thus the sustaining competitive advantage of a new entrant must be price. This is also the main reason that one sees price wars, since there is very little else to fight over.

(ii) Now let us look at the cost of getting a new customer. First the ILEC has no such cost, since at the resident monopoly it already has the customer. Thus the CLEC must seek out and convince a customer to switch. This costs may be say $300 which is a one time costs. In addition there is churn. The churn may be due to the CLEC's own ability to serve but it is also due to the ILEC's delays; delays in UNE installation such as a loop, delays in number portability, delays in a variety of factors. Thus to keep a customer the CLEC pays a substantial fee for churn, namely for getting new customers lost due directly to actions of ILECs in their required provisioning of the CLEC at the interconnection point. This is a measurable and quantifiable cost.

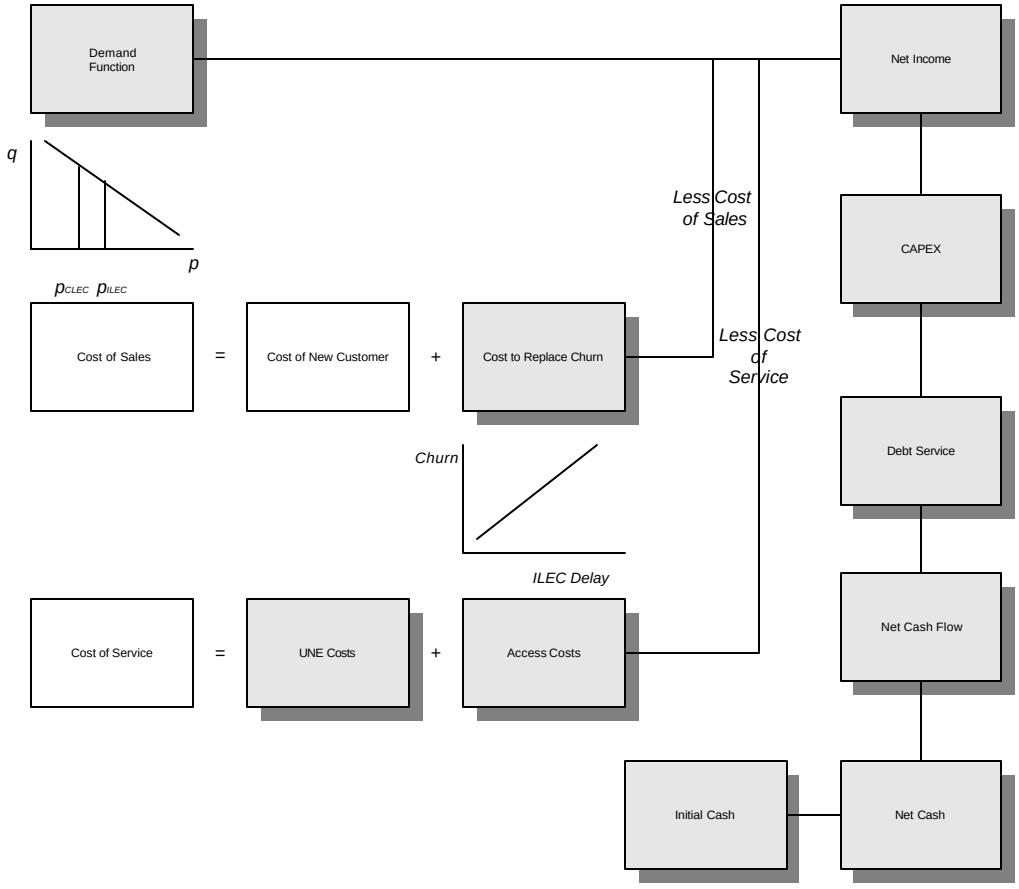
(iii) Cost of Service is the costs incurred by the CLEC in implementing the service. Here we show two elements; UNE or loop costs and access fees. These are fees in addition to what the ILEC may pay and as we argue herein these are in many cases disproportionately too high or unnecessary.

(iv) Cash is the ultimate metric of this system. Cash at the end is the only way to measure success. If a CLEC starts with $x in cash, then in two years does it have more or less. If less, then it may never survive, if more then is may. The cash metric is the measure of sustainable stability in the industry.

If we further look at this type of model for each segment, and then go down one or two more layers, it is readily easy to create a dynamic model for the overall industry and then ask the following questions:

(i) Is the industry stable, and if not can it be made so?

(ii) What impact does government regulation have on the industry and if such an impact can be ascertained, which many can, what should the policy be and is the regulation consistent with policy?



It is possible and further the models have been developed to determine the dynamics of the telecommunications industry.[5] For example, using the above paradigm, we can create the following model:

The detailed analysis of this industry model is introduced in the Appendix. The model has been generalized for an N player industry and considers pricing as the sole strategy which can be played and the limiting

[5] See McGarty, Business Plans, Wiley, 1989, also see papers by McGarty in TPRC wherein this issue is developed for PCS market valuation.

facto is cash at the end of the game. Each move adds or reduces cash positions of all players. All players must play at each round. We show in the Appendix that the ILEC and CLEC two player game is always biased in the favor of the ILEC under the current regulatory regime. However, it is also shown that there are instabilities which can result in industry instabilities as we suggest herein.

1.2 The Press View

On August 23, 2002, the Wall Street Journal published an editorial, which stated the following:

" As if the telecom market meltdown isn't bad enough, the industry now bids to give us a legal shakedown too. It comes in the form of a new strategy marrying two of the most debilitating parts of U.S. law: antitrust and mass tort claims.

This effort has just received a tremendous boost from two federal appeals-court rulings reinstating dubious antitrust lawsuits against both Verizon and BellSouth. If the Justice Department and Federal Communications Commission don't wake up fast, the few healthy companies left in telecom will be served up to the plaintiffs' bar like fresh-roasted turkey."

It is clear that even the WSJ fails to understand the core element in the collapse. It is the fact that the RBOCs have been acting in a manner which has violated the antitrust laws, whose purpose is to ensure competition and not protect competitors. The few health companies are inherently suffering from terminal malignancies, which are of the governments making and their own denials of the failure of the regulation to deregulate.

The WSJ then goes on to state:

"The source of this mischief traces back to the usual suspect: The 1996 Telecommunications Act. Though the act's purpose was deregulation, it actually created Potemkin competitors by imposing obligations on the Bell companies to share their services, most notably use of their lines."

The WSJ surely knows that the 1996 Act was to remedy the monopoly control and strangle hold that the RBOCs have had on local telephony. In one of their former reports classic book on telecommunications reform, Coll clearly outlined the tremendous efforts the old AT&T took to keep the tiny MCI competitor from entering the business. The chart above shows unambiguously how Worldcom, the owner of MCI, is drained of its lifeblood because of access and interconnection fees. A strategy the RBOCs use to eliminate all competition.

The WSJ further observes:

"Since then there's been a war on. Because they think they'll have to share, the Bells have no incentive to invest in infrastructure. They also howl how unfair it is to have to give rivals access to their assets. Meanwhile, their competitors accuse the Bells of trying to bankrupt them by not really cooperating. Mandated sharing also gives them little incentive either to build their own infrastructure or seek technological alternatives."

Mandated sharing was the cost of having the monopoly hold for almost 100 years. Not building infrastructure is a more fundamental issue. We show herein it is not that they do not want to, it is that they are so inefficient they cannot afford to. The result is that they behave in a fashion to prohibit entry to any other player who could.

The WSJ then summarizes the antitrust issues in some minor detail, failing to present antitrust in any clear light. Specifically:

"In her ruling against Mr. Goldwasser, a Seventh Circuit judge made two key points. In traditional antitrust actions, companies are typically asked not to provide more assistance to their rivals but to stop

doing something that does them harm. And why have a regulatory body (the FCC) set up to deal with these issues if it's going to end up contradicted and superseded by courts and juries?

Unfortunately, other courts have now issued new rulings contradicting Goldwasser. The Eleventh Circuit waved through an antitrust action against BellSouth by Covad Communications this month. Only a few weeks earlier, the Second Circuit ruled that a customer can file an antitrust claim on the grounds that his local service (provided by AT&T) suffered because of monopolistic behavior by Verizon."

The antitrust laws are set up to specifically remedy monopoly control when the government refuses to even address the issues. This fact the WSJ refuses to look at. The result is the today the courts in clear and unambiguous terms, with use of precedent, have allowed the consumer to seek remedies.

The WSJ then concludes,

"All of these cases are no doubt headed to the Supreme Court for resolution. But it would help immensely if FCC Chairman Michael Powell would re-enter the fray and if the Justice Department would make the case for freeing up telecom markets. The Bush Administration has talked a good game about reviving telecom, but in practice it has sat by and watched the carnage like highway accident gawkers. If this new antitrust theory succeeds, it will be watching that carnage for a lot longer."

In fact, this antitrust path is the only one open because the FCC has repeatedly denied the access problem, except when the ox gored was the RBOC in the case of ISP interconnectivity. We address many of these issues in this paper.

Last year in Vienna, Austria, at a meeting with Telekom Austria, explaining why the US has so many lawyers, I explained:

"In the US we make laws two ways; first we have Congress, if that does not work we then have the Courts, and we the people can go to the Courts and they eventually generally fix what Congress and the Government got messed up. When we the people sue, we the people create better law, no other country as that capability of people themselves eventually making good law"

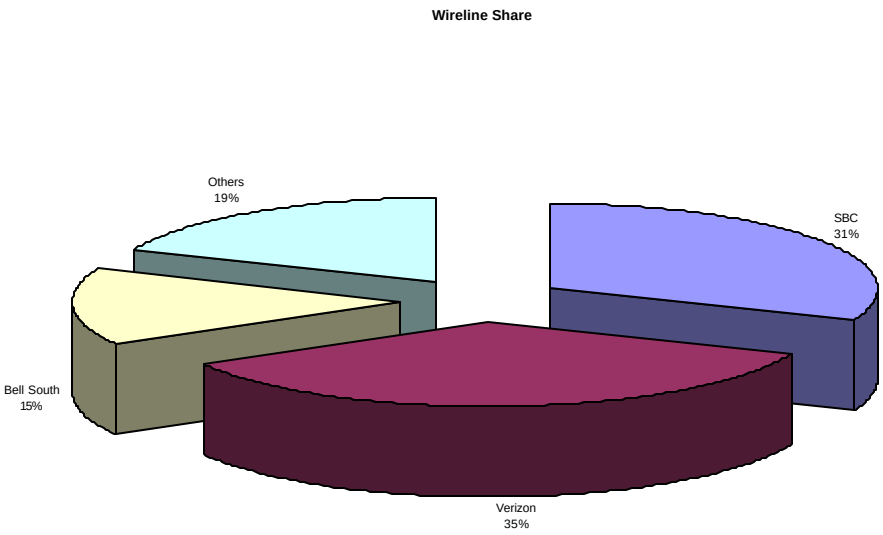
That is why antitrust litigation is the best fix to bad implementation of the 1996 Act.

2 THE PLAYERS

One should look at all elements of the industry and understand two things; first the interconnectedness of all elements and second the ongoing capital intensiveness of the industry. It literally eats money. For example, Verizon's capital budget for 2002 exceeds $15 billion on revenue of slightly in excess of $67 billion. Their total assets are listed as $170 billion, specifically property, plant and equipment. Net PP&E is about $75 million, so that the company generates $0.89 or revenue per dollar of PP&E, and

2.1 ILECs

The ILEC wireline market is seeing negative growth in certain areas of ILECs like Verizon. The following chart depicts the ownership of the wireline Market by carrier, the three large RBOCs, and all others. Verizon owns 36% of the market and SBC 31%. Bell South is a distant third and Qwest is not considered due to its financial fragility.



The state-by-state penetration is shown below:

State	ILECs	CLECs	Total
Alabama	2,381,574	117,159	2,498,733
Alaska	462,804	*	*
Arizona	2,981,156	310,517	3,291,673
Arkansas	1,363,454	*	*
California	22,771,976	2,003,404	24,775,380
Colorado	2,727,654	391,257	3,118,911
Connecticut	2,329,716	187,450	2,517,166
Delaware	552,331	0	552,331
District of Columbia	865,008	126,461	991,469
Florida	11,019,972	866,809	11,886,781
Georgia	4,723,842	600,087	5,323,929
Hawaii	735,459	*	*
Idaho	706,991	*	*
Illinois	7,578,706	1,341,060	8,919,766
Indiana	3,637,893	205,845	3,843,738
Iowa	1,356,643	186,254	1,542,897
Kansas	1,397,937	145,659	1,543,596
Kentucky	2,759,067	*	*
Louisiana	2,440,988	93,107	2,534,095
Maine	764,536	*	*
Maryland	3,660,869	158,999	3,819,868
Massachusetts	3,931,469	669,209	4,600,678
Michigan	5,965,971	865,182	6,831,153
Minnesota	2,698,867	394,310	3,093,177
Mississippi	1,332,389	43,578	1,375,967
Missouri	3,328,130	262,947	3,591,077
Montana	521,550	*	*
Nebraska	1,030,125	144,229	1,174,354
Nevada	1,352,724	*	*
New Hampshire	758,515	85,549	844,064
New Jersey	6,482,459	330,005	6,812,464
New Mexico	965,946	*	*
New York	10,223,476	3,353,394	13,576,870
North Carolina	5,023,740	302,044	5,325,784
North Dakota	306,963	*	*
Ohio	6,967,603	352,811	7,320,414
Oklahoma	1,873,489	160,186	2,033,675
Oregon	2,043,164	153,084	2,196,248
Pennsylvania	7,524,072	1,186,897	8,710,969
Rhode Island	570,513	108,190	678,703
South Carolina	2,276,681	72,035	2,348,716
South Dakota	327,150	*	*
Tennessee	3,289,154	268,222	3,557,376
Texas	11,365,441	2,166,033	13,531,474
Utah	1,086,537	155,992	1,242,529
Vermont	388,399	*	*
Virginia	4,436,193	537,753	4,973,946
Washington	3,635,702	336,230	3,971,932
West Virginia	967,218	*	*
Wisconsin	3,121,462	367,195	3,488,657
Wyoming	255,790	*	*
Nationwide	172,628,691	19,653,441	192,282,132

The question to be posed is what is the future of the wireline entities as wireline entitles. Is there a future in any one of them or is their inherent structure unstable.

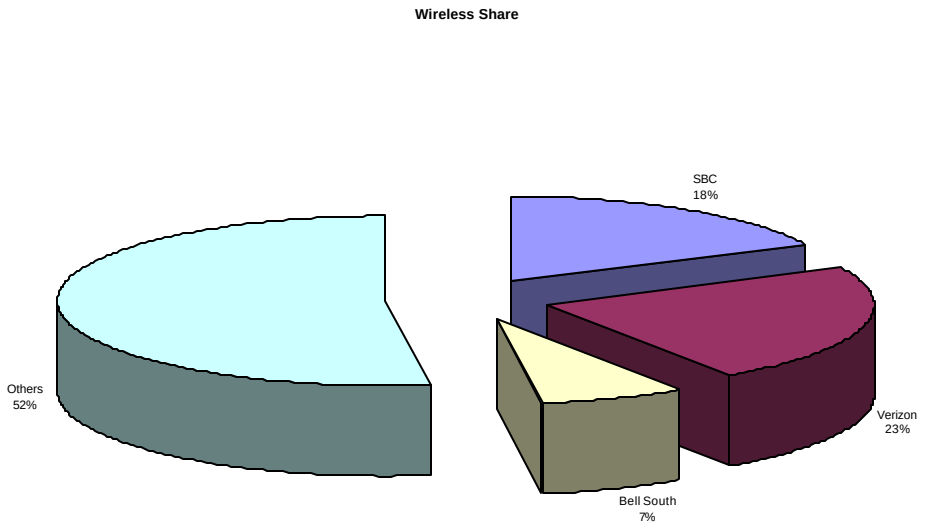
Can they ever be profitable or are they underwritten by elements of the industry welfare system that makes them look profitable but that they are inherently unstable? We argue herein, using Verizon as an example, that the access fee supports artificially allow the RBOCs to survive but that with them removed they falter. This is a serious problem for the industry since this same support structure has been used by the RBOCs to eliminate any form of competition which could have made the market more economic and allowed for clearing of the market from an economic perspective. This elimination of access fees, which we believe is

essential in a fully competitive market, would result in a possible financial loss of significant amounts for the ILECs.

2.2 Wireless

The wireless market is growing aggressively. It is not as aggressive as Europe bur despite all of its elements it is still growing. It is a commodity business, but it is run as an oligopoly. There is no price to the death approaches as has been seen in international switched voice or in Internet access. The reason for this is that it is the relationships between the players, one dominated by former Bell System executives as compared to the IBB market dominated by the more aggressive Internet community.[6] However, if raw price competition commences, then the same melt down phenomenon may happen here as well. The idea of hyper-competition in wireless is not yet evident, carriers are competing on complex pricing schemes and bundling. They are anticipating their future to be in broadband wireless so they are still willing to invest. However, it may be observed that their present is that of a direct competitor with the ILECs.

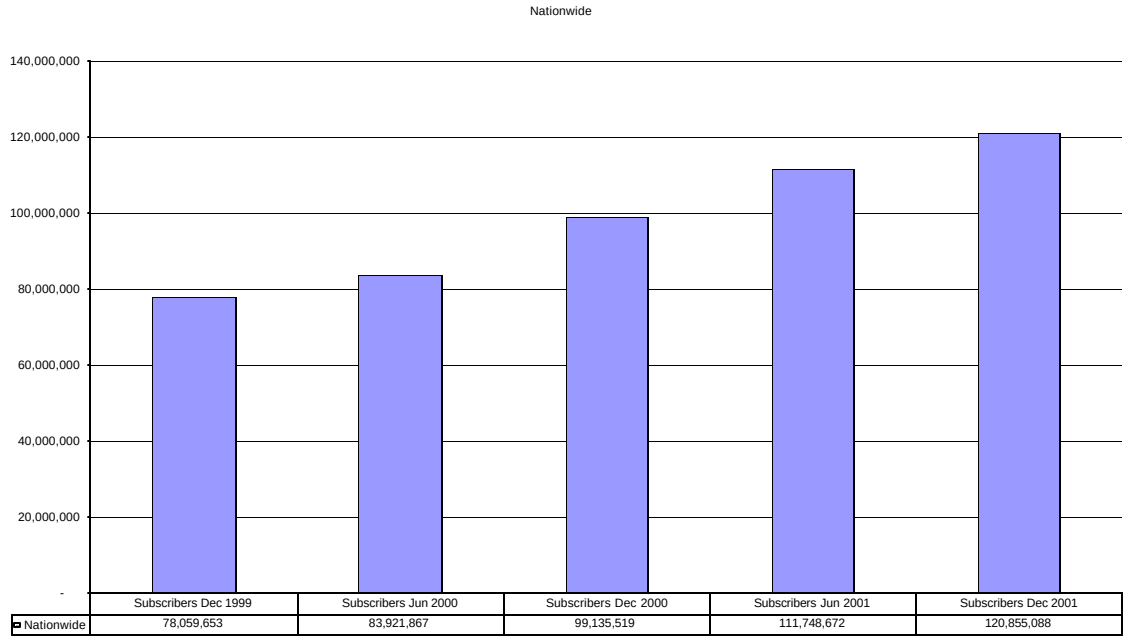
The following depicts the market share for wireless subscribers. Note that Verizon has 23% of the wireless market, which considering it has 36% wireline market, and that there are on average 4 carriers per market, one would assume they would in an equal world have 9% share of wireless. This means that they dominate in their markets. AT&T is another dominant player but not show expressly.



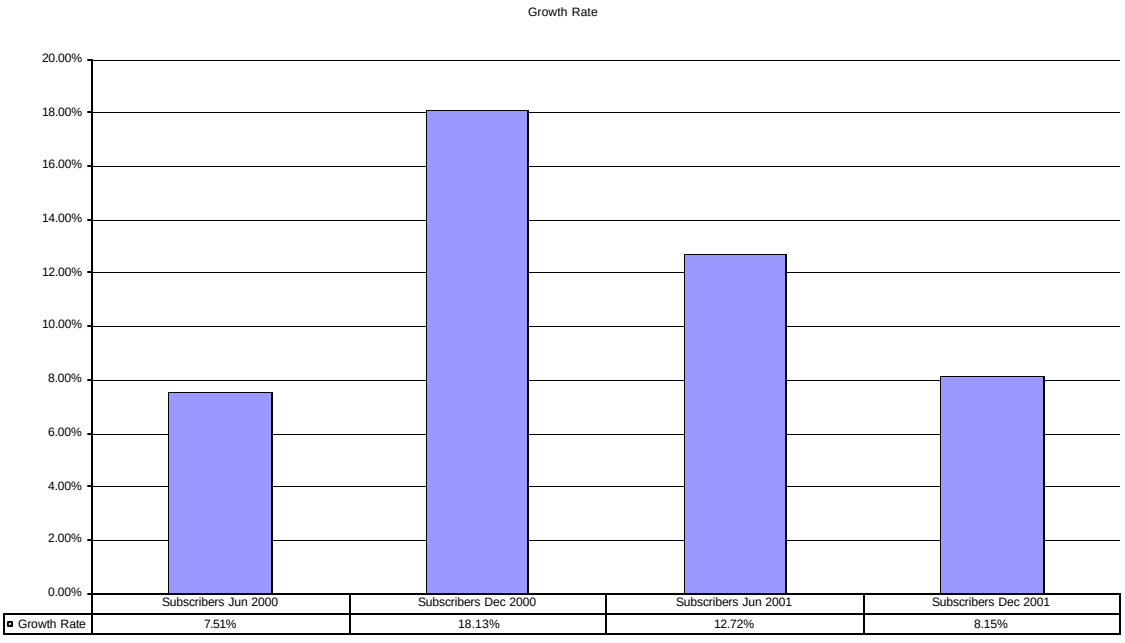
The following is a table of quarterly growth in wireless subscribers.[7] This shows the continuing growth in this market by quarter, a phenomenon which equals the European markets, albeit trailing a bit.

[6] See the paper by Freiden.

[7] See FCC Report on Wireless Growth, June 2002. These numbers are through December 2001.



The following Table depicts the growth rates for each quarter. It is clear that growth rates have been maintained. Even in the most recent quarter of statistics, the growth rate is in excess of 8%.



The details by state for wireless are shown as follows:

State	Subscribers Dec 1999	Subscribers Jun 2000	Subscribers Dec 2000	Subscribers Jun 2001	Subscribers Dec 2001
Alabama	1,080,410	1,253,084	1,386,294	1,930,631	1,924,476
Alaska	165,221	169,892	*	218,424	240,216
Arizona	1,125,321	1,624,668	1,855,115	2,018,410	2,171,021
Arkansas	719,919	715,467	743,928	891,275	970,127
California	8,544,941	12,283,369	12,710,520	14,184,625	14,997,358
Colorado	1,552,718	1,654,989	1,856,075	1,983,405	2,145,816
Connecticut	1,077,089	1,136,618	1,277,123	1,418,367	1,616,937
Delaware	270,848	275,219	371,014	389,284	412,611
District of Columbia	910,116	NA	928,962	987,323	1,008,397
Florida	5,158,079	4,983,478	6,369,985	7,536,670	8,521,734
Georgia	2,538,983	2,687,238	2,754,784	4,076,119	4,020,010
Hawaii	288,425	454,364	524,291	543,283	595,721
Idaho	271,436	296,066	344,564	398,781	444,864
Illinois	3,922,482	4,309,660	5,143,767	5,621,044	5,631,172
Indiana	1,318,975	1,717,378	1,715,074	1,781,247	1,897,049
Iowa	774,773	975,629	832,106	861,382	1,087,608
Kansas	669,472	724,024	801,293	901,225	956,050
Kentucky	911,700	999,544	1,026,334	1,176,756	1,307,988
Louisiana	1,227,106	1,294,693	1,306,457	1,677,292	1,838,244
Maine	187,003	283,640	359,786	399,616	427,313
Maryland	1,473,494	3/	1,982,477	2,134,125	2,298,384
Massachusetts	1,892,014	2,228,169	2,649,130	2,753,685	2,988,667
Michigan	3,512,813	3,423,535	3,551,719	4,071,091	4,238,399
Minnesota	1,550,411	1,595,560	1,851,430	2,014,317	2,153,857
Mississippi	673,355	509,038	786,577	993,781	980,918
Missouri	1,855,452	1,848,775	1,767,411	1,937,684	2,106,599
Montana	*	*	*	*	279,349
Nebraska	576,296	600,885	659,380	712,685	791,799
Nevada	750,335	825,163	684,752	766,581	842,155
New Hampshire	280,508	309,263	387,264	445,181	492,112
New Jersey	2,289,181	2,750,024	3,575,130	3,896,778	4,283,643
New Mexico	363,827	395,111	443,343	619,582	660,849
New York	4,833,816	5,016,524	5,918,136	6,749,096	7,247,181
North Carolina	2,536,068	2,730,178	3,105,811	3,377,331	3,605,441
North Dakota	*	*	*	*	*
Ohio	3,237,786	3,278,960	4,150,498	4,255,934	4,739,795
Oklahoma	826,637	979,513	1,124,214	1,200,234	1,288,357
Oregon	914,848	1,082,425	1,201,207	1,268,909	1,399,279
Pennsylvania	2,767,474	3,850,372	4,129,186	4,378,216	4,849,085
Rhode Island	279,304	313,550	355,889	401,805	454,936
South Carolina	1,137,232	1,236,338	1,392,586	1,502,345	1,625,392
South Dakota	*	*	*	*	278,646
Tennessee	1,529,054	1,876,444	1,985,851	2,251,208	2,443,483
Texas	5,792,453	6,705,423	7,548,537	8,294,338	9,062,064
Utah	643,824	692,006	750,244	833,492	919,002
Vermont	*	*	*	*	*
Virginia	1,860,262	3/	2,450,289	2,767,247	2,982,089
Washington	1,873,475	2,144,767	2,286,082	2,493,214	2,706,030
West Virginia	241,265	347,916	392,384	452,036	498,811
Wisconsin	1,525,818	1,342,908	1,698,520	2,008,679	2,229,389
Wyoming	127,634	*	*	173,939	194,665
Nationwide	79,696,083	90,643,058	101,043,219	114,028,928	122,399,943

In 1993, McGarty stated the following in a paper to an MIT Symposium on wireless:

“The wireless communications services defined as PCS, Personal Communications Service, has been defined as:

" The provision of toll grade wireless voice and data telecommunications services in a national seamless interoperable network."

This implies the following:

(1) "Toll Grade": The quality of the service is equal to or better than that of the current telephone service provided by the LEC.

(2) "Wireless": The service is provided in a totally wireless fashion in a wide variety of locations. The use may use the system, namely the same terminal device, for access the service from their home, auto, office, or any other such location. The service is not delimited in any fashion.

(3) "Voice and Data Telecommunications Services": This implies that the service is flexible enough to support voice and data and that the voice is that of toll grade quality and the data is of rate and performance adequate to meet most of the customer's needs. The concept of being telecommunications services is that the service be more than just a voice or data connection in that it provides a wide variety of enhanced network services.

(4) "National": The service must be a national service, providing, ultimately, a national coverage. This is a challenge in terms of assuring that all areas of the country are covered, especially those that have very low population density. This may require a system approach that is integrated with other wireless systems, such as satellite.

(5) "Seamless": This implies that one can use the same terminal in one city and another, in one location and another. It implies that the home terminal may be brought into the office and that the terminal also works in the auto. The seamless requirement is s significant requirement in terms of the goals of single terminal. This does not necessarily mean a single service. The terminal may be multi mode in terms of its operations.

(6) "Interoperable": The service must work with other complementary systems, such as satellite systems. It must function in a transparent fashion to the user and allow the user to access communications without necessarily knowing where the service is provided.

(7) "Network": The service is a network of services. The services are provided in an integrated fashion with a common set of service platforms and capabilities.[8]

There is a five point strategy to achieve the Goal described. This strategy is as follows:

(1) Operational Availability by 1994: It is assumed that AT&T and subsequently the RBOCs are the most significant competitors. In addition it is assumed that they will have equal capability to develop modifications in infrastructure to compete in this business in a two year time frame. Thus it is essential that the Consortium have some operational capability by the end of 1994. In addition it is assumed that if the FCC awards a license in early 1994 or earlier that operational status must be achieved at least in eighteen months and thus a target operational frame of twelve months allows for modifications if necessary.

(2) Capital per Customer less than $100 at penetrations of 50,000 per system: The technology base currently allows for this number and this number is what is necessary to keep the capital and cash requirements at reasonable levels. Some vendors of equipment, such as Motorola and others have capital per sub factors four to six times this number. These systems do not allow for commidicization of the service and are barriers to entry to competition in the LEC market. This number is for outside coverage and does not address the issues of internal systems as well as external.

[8]See the paper by Huber on the Geodesic network. Huber agues that the evolution of networks is into a network of networks, thus the geodesic. The arguments in McGarty, Architecture, are similar but are must more specific. McGarty and McGarty, in Architectures et Structures, Reseaux , argue further that this fits the nature of infrastructures and as such are key to the policy discussions underway in Washington. The authors argue that an infrastructure requires more than just a financial investment in a large national entity. The qualities of an architecture are those that sustain it and allow it to become an enabler of other economically viable entities. In particular, the authors have defined an ***infrastructure as a shareable, common, enabling, enduring resource that has scale in its design, is sustainable by an existing market, and is the embodiment of an underlying architecture.***

(3) Cost for acquisition of each new customer of less than $300: This implies that there is a national branding and promotional capability in the Consortium and that sales is centralized and highly efficient. It also assumes that there are minimal numbers of dealers and that for the most part the sales are performed on a direct basis with no intermediary overhead. It has been suggested that this can be done via national advertising with a direct in bound telemarketing accompanied by direct ship of the portable.

(4) Access fees per minute of less than $0.03: The access fees are the cost of goods. Currently cellular pays about $0.08 to $0.11 per minute. With PCS user rates this implies that with 300 minutes per person per month, $33 per month cost of goods is unacceptable. The strategy is to disaggregate the LEC and to do so via several fronts. These fronts are direct frontal attacks, indirect bypass via Class 4 interconnect, and co-carrier status. The scale and scope of resources are necessary for this to occur.

(5) Cost per portable of less than $100 at the one million sold point: This can be done only through bulk buys and also only through the use of a single sales channel for national distribution.

These five strategies will assure the ability to commodicize the basic product and compete directly with the LEC and any other competitors."

The conclusion McGarty drew from this analysis was that wireless could replace wireline if the requirements were met. They are almost there. The only final barrier, albeit meeting his 1993 conditions, was access fees. Indeed the wireless market has been made into a commodity, and the growth changes are significant. Pricing is still falling.

2.3 Internet Backbone

The "Internet" is 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.

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 six 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 carriers and companies[9].

To support customer expectations, an Internet service provider must have access to the rest of the Internet. Because these independent networks are organized under separate administrations, 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.

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.

Approximately twelve entities, six commercial and six U.S. governmental entities[10], provide the backbone services, running over communications links with capacities measured in many gigabits, or billions of bits

[9] With the exception of C&W

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

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 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, which an ISP does not have to pay for transit service. They interconnect with a bill and keep approach, namely not paying one another for the access and interconnection.

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, enter into transit agreements, and pay for delivery of at least some of their traffic.

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.

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.

In September 2000, significant pressure was brought upon the large (mostly US-based) backbones by the FCC and ITU. 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.[11] 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.

The large backbones, preferring self (as opposed to government) regulation of their business positively responded to the FCC's suggestion thus being able to charge to smaller, ISPs transit fees. 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."

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.

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

2.4 CATV

CATV was never cash flow positive and if financing for this industry dries up, they also may have to face bankruptcy.[12] The recent examples of Adelphia and Cablevision show the signs that some of the larger but more classic companies are suffering. The issue of CATV cost and cost structure is dominated by the content providers and their pricing. When you add all of these up you get so many players balancing each other up that when they start to fall it will all collapse. The consolidation of AT&T and Comcast is one attempt to reconcile this issue. Comcast was as close to getting cash flow positive system, however, with AT&T they have most likely been set back several years. This means the continual need for cash for growth.

3 VERIZON

The analysis of Verizon is very telling. Consider the summary financials shown below which are the Q1 and Q2 financials provided by Verizon.[13] We have separated wireline from wireless. The key observations are that when one eliminates the access fees that are being paid to the wireline, is becomes a significant cash users, in this case almost $2.5 billion for two quarters.

3.1 Gross Revenue: Sources

In the following analysis, we have considered the Gross Revenue as reported. We have determined adjustments, which are effectively interconnection, and access fees that Verizon receives from third parties. The important fact to consider is that Verizon wireline growth is –6.3% in the last two quarters, namely wireline growth is negative for the first time since the midst of the depression. Wireless growth is in excess of 10% for the same period. The impact of this fact is not explicit in this table, it must be extrapolated, showing that wireless may outstrip wireline and that wireline will have less and less investment due to its poor return. The question is, "is this a fact of nature in the business or is that a deliberate strategy by Verizon to orphan wireline".

Summary for Q1 and Q2 2002 (See Verizon 10Q, August 2002, $000,000)

		Wireline	*Wireline per AL per month*	*Wireless*	*Wireless per Sub*	*Total*
Access Lines		*61.0*		*27.9*		*88.9*
Gross Revenue						
Local Service	*Local Exchange, plus UNEs, CLEC, and wireless carriers*	*$10,465*	*$28.59*	*$9,112*	*$54.43*	*$19,577*
Network Access Services	*Inter Exchange Carriers, data services*	*$6,875*				*$6,875*
LD Services	*In region LD services*	*$1,556*	*$4.25*			*$1,556*
Other	*Billing and collections for other carriers, coin, cpe, and other services*	*$2,046*				*$2,046*
Total Gross Revenue		*$20,942*		*$9,112*		*$30,054*

[12] See Vogel for an updated financial analysis of CATV. Also look at such recent actions of Cablevision, where there is gross losses in CATV operations and the intent to sell.

[13] See Verizon 10-Q, for the Quarters ending June 30, 2002.

The second step is to estimate the potential adjustments to the income statement in the event that the subsidies are eliminated, in this case access fees. The following Table creates estimates for these factors. Shown below they are in two categories:

(i) Local Service: This is itself divided into wireless fees and UNE fees. The wireless fees are the largest. They are interconnection fees as shown between the wireless carrier and the ILEC. The ILEC however has several of the wireless customers, slightly more than 20% in the case of Verizon. Thus this money is a transfer. However, it represents a significant portion of the ILEC revenue stream. The second element is the UNE fees. Here there is great argument that they fees are less than costs. A simple calculation is revealing. About 10% of all access lines are CLECs. The UNE fees are approximately $582 million. All depreciation and amortization is $4,758 million. Thus 10% of that number is $475 million, much less than the UNE fee, and that assumes that the CLECs buy all of the network! In fact they buy generally access lines, which is less than 30% of that number. Thus, one can estimate that the UNE fee should be in excess of $150 million, but it is almost four times that number!

(ii) Network access is the IEC or Long Distance interconnect. It is about $1,208 million. This is dramatically lower than what is has historically been since the ILECs have now agreed to an interconnection of $0.0055 per minute.

The key observation in the following Table is the fact that these adjustments can be eliminated with the stroke of a pen. They are however the major reasons that ILECs are profitable. They also are the major reasons that competition is controlled. This single feedback node in the overall telecom business reflects the essence of the inherent instability prevalent in this business.

Adjustments

Wireless Access	*Includes access fees from Verizon wireless representing less than 20% and remaining access fees from other carriers.*	*$4,406*		*$502*	*$4,909*
UNE Fees	*UNE and co lo fees are based upon CLEC penetration and gross margin of CLEC revenues allocated to UNEs*	*$582*			*$582*
Local Service	*Cost of CLEC access plus UNE overcharge plus wireless interconnect*	*$4,988*	*$13.63*	*$502*	*$5,491*
Network Access Services	*IEC Fees based upon the $0.0055 per min charge and typical usage per month per subscriber.*	*$1,208*			*$1,208*
LD Services		*$0*	*$0.00*		*$0*
Other		*$0*			*$0*

The summary results are shown in the following Table.

Effective Revenue

Local Service		*$5,477*	*$14.96*	*$8,610*	*$51.43*	*$14,086*
Network Access Services		*$5,667*				*$5,667*
LD Services		*$1,556*	*$4.25*			*$1,556*
Other		*$2,046*				*$2,046*
Total Effective Revenue		*$14,746*		*$8,610*		*$23,356*
Operating Expenses	*For the wireless company the interconnect fee is netted out of the expenses since it was netted out of the revenue*	*$11,170*	*$30.52*	*$5,865*	*$35.04*	*$17,035*
Depreciation and Amort		*$4,758*	*$13.00*	*$1,566*	*$9.35*	*$6,324*
Interest	*Interest is grouped together. It has been allocated to wireline because there is no clear way to allocate at this time.*	*$1,612*		*$0*		*$1,612*
CAPEX or Debt	*The CAPEX is covered by Debt issued by subs. Only a few are listed. There is no clear way to see new CAPEX from the stats for each unit. Clearly it is even greater than this number. If one assumes a 5 million sub growth and a $500 incremental CAPEX per sub this is an incremental CAPEX of $2.5 B. Assume it is just half of that for wireless since they may have had inventory.*	*$4,416*	*$12.07*	*$1,250*		*$5,666*
Cash Flow		*($2,452)*	*($6.70)*	*$1,495*	*$8.93*	*($957)*

Let us now consider several conclusions from the above analysis:

1. Revenue is flat at best on the wireline side.

2. Local Service and Network Service account for the core of the business. Other services are decreasing since they generally seem to be third party services to other carriers who are affecting that service less expensively themselves.

3. The adjustments are made using access and UNE fees. The largest contribution is from wireless carriers who pay for access and interconnect. This is the largest element of the revenue stream. This is also the one most at risk. If access elimination occurs in this area then all of these revenues are eliminated. This of course would have a net zero impact on wireless but its impact on wireline would be extensive and would drive the overall business under water. Legislation seems to be moving in that direction. In the 1993, MIT paper by McGarty this issue was brought to the fore as

a key element for wireless competition peer to peer with wireline. The numbers clearly show which provides the best telephone service.

4. The operating expenses are more than half of the revenue. There is no concept of gross margin since they RBOC charges but is not charged. However of the Total Effective Revenue, namely the revenue less the at risk numbers, the difference is less than $3 billion.

5. CAPEX is assumed equal to the new debt. The new Debt is listed only for local operating companies and is $4.4 billion for the half year. Clearly there is other debt. The projected numbers are nearer to $7.5 billion but we have maintained the published number.

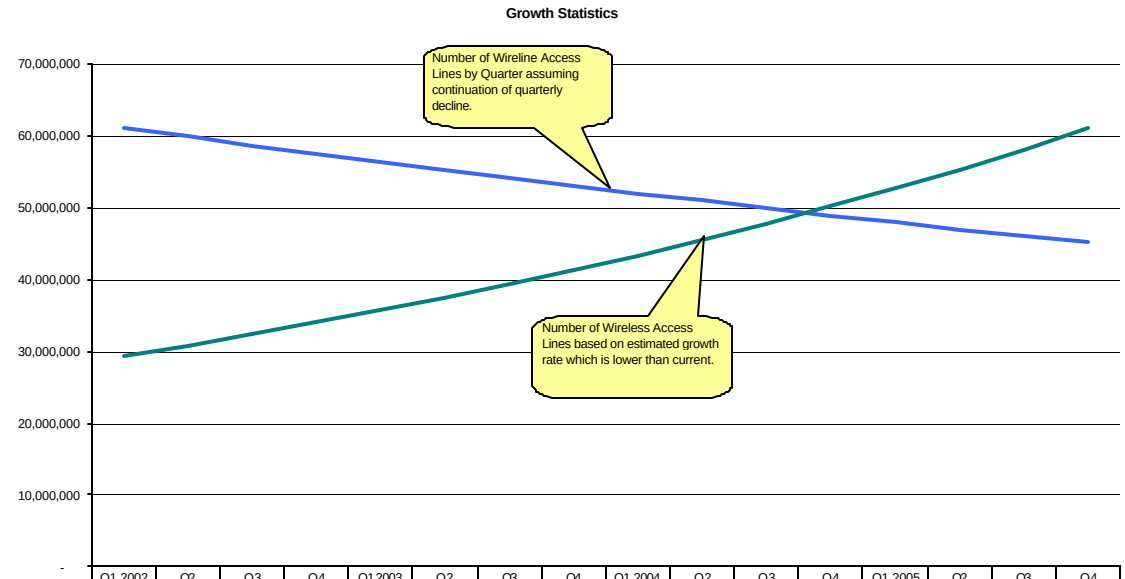
6. Cash flow is negative $2.5 billion for the half year for the wireline segment.

7. The wireless segment is modified by the elimination of access but there is not impact on cash flow.

8. The combined cash flow is negative, despite positive cash flow from wireless. The issue is how does a Verizon deal with this issue.

3.2 Growth and Destruction

If one were to look at Verizon growth rates for wireline and wireless and project them out two years then the wireless lines exceeds the wireline lines in mid 2004. This phenomenon has been seen in Italy where the current mobile phone penetration is twice that of wireline. Although the wireline in Italy was low in terms of penetration, the growth has been in wireless. The quarterly growth rate for cellular have been above 8% but we assume that they drop to only 5% and that the wireline losses which have been in excess of 3% are only 2%. In this world, the following chart depicts the growth and decline.[14]



	Q1 2002	Q2	Q3	Q4	Q1 2003	Q2	Q3	Q4	Q1 2004	Q2	Q3	Q4	Q1 2005	Q2	Q3	Q4
Wireline	61,000,00	59,780,00	58,584,40	57,412,71	56,264,45	55,139,16	54,036,38	52,955,65	51,896,54	50,858,61	49,841,44	48,844,61	47,867,72	46,910,36	45,972,15	45,052,71
Wireless	29,295,00	30,759,75	32,297,73	33,912,62	35,608,25	37,388,66	39,258,10	41,221,00	43,282,05	45,446,16	47,718,46	50,104,39	52,609,61	55,240,09	58,002,09	60,902,20

[14] It should be noted that Prof. Negroponte several years ago predicted that wireless would be used for narrow band and fiber for broadband. This projection shows how prescient this was. McGarty, in 1992 also stated that wireless when commodicized would be an efficient replacement for the wireline option.

This begs the question of what do customers want. It appears that they want telephone service like a cellular phone, and they want CATV but more, and they want Internet access but not clear how much broadband, since quite frankly there is little if any. The challenge for a Verizon is to understand what the end-user wants. The risk to Verizon is that they are defending old turf and this is forcing other non-traditional competitors to consider alternatives. The clearest example is the explosive growth of municipal broadband, the unbundling of the local loop in the extreme, with full and complete open access.

4 GENUITY

Genuity is an example of a telecommunications company in free fall. It is the second Internet backbone to fail, the first being PSI. The most recent financials are shown below, the first being the income statement. They have revenue of $281 million, down from $316 million, in March of 2002, and most importantly a gross margin of (30) million. There is a serious question of whether an IBB can be profitable in a market with hyper-competition. We argue below, that Genuity is a good example to diagnose the problem and see that there are reasons why Genuity has not been profitable, and many of those have nothing to do with the backbone.

Let us first present a simple example on the international scale. If one were to provide IBB service to Europe, then a connection between the US and Frankfurt would be about $15,000 per month per STM-1, 155 Mbps. That is $100 per Mbps. However, the spot market price is now $50 per Mbps in Frankfurt for peering. That is half the cost. How does one get around this. Maintenance and overhead may actually add $50 to the already $100 fee. The answer is load sharing, namely placing three or four carriers on the same backbone. That means $200 revenue with $150 expenses. The issue then is what are the dynamics of this market, if he prices decline, then will the costs decline also, if not, then there is a margin squeeze. There is also QoS or Service Levels, via, SLAs which are important. To better understand this we look at the Genuity financials.

4.1 Current Status

The following is through March 2002. The most recent version, through June of 2002 is really one for a company on the brink of bankruptcy and shows that effect more than any fundamental structure of the business.

Period Ending ($000):	*Mar 31, 2002*	*Dec 31, 2001*	*Sep 30, 2001*	*Jun 30, 2001*
Total Revenue	*$281,594*	*$316,037*	*$302,262*	*$302,794*
Cost Of Revenue	*$311,295*	*$311,783*	*$318,965*	*$345,498*
Gross Profit	*($29,701)*	*$4,254*	*($16,703)*	*($42,704)*
Operating Expenses				
Selling General And Administrative Expenses	*$110,103*	*$133,441*	*$135,845*	*$152,794*
Non Recurring	*$3,567*	*$2,709,005*	*$424*	*$47,909*
Other Operating Expenses	*$87,649*	*$150,026*	*$128,721*	*$103,185*
Operating Income	*($231,020)*	*($2,988,218)*	*($281,693)*	*($346,592)*
Net Income From Continuing Operations	*($257,508)*	*($3,014,052)*	*($300,378)*	*($353,573)*

The most critical observation is to view the gross margin. It is negative and has always been that way. In the following analysis, we have used industry standards and their data to reconstruct the cost of service elements. Clearly, they are all fixed. They have over a billion dollars of fixed costs to exceed, and additional costs if the expand capacity, not revenue.

Note in the following:

- First, Revenue is dominated by AoL and Verizon sources of revenue. Both revenue rates per Mbps are due to decline contractually over the next few years. Given the low growth, rates this means negative revenue growth in the core. In addition, both AoL and Verizon are under significant pressure. Thus, sustainable business is unlikely.

- Second, The revenue per Mbps is dropping globally. This means that even with projected rate declines in their captive customer base the same if not more holds true elsewhere. As noted, the international transit rate has declined from over $400 per Mbps last year to less than $30 per Mbps this year.

- Third, the fixed costs on gross margin may be re-negotiated, but they are required for the distribution and interconnection for the Internet. Verizon is a provider of the backbone and infrastructure elements. This means that there are significant related third party elements, despite 10-Ks and 10-Qs, which one cannot understand from afar.[15] This is also the same with the UUNet situation and the reliance on MCI and Worldcom backbone. It is not clear how much there may be IRU purchase in these areas, which may inflate certain revenues and reflect poorly long-term of IBB survival.

4.2 Elements of Failure

The following Table takes the Genuity information and breaks it out into specific details. The details show where the costs may be arising and it shows how possibly these costs can be contained. The main problem with Genuity, and quite frankly any IBB, is the rapidly declining price points, driven by survival moves by other players, and the fixed costs of infrastructure, purchased with long term agreements in an environment where the prices for these elements have collapsed.[16] These elements are fiber backbone and co-location space. The only place where such co-location space has not dropped is with RBOC/ILEC co-location. That is why Genuity is collapsing. The supply AOL and Verizon, use Verizon space, and face the same problems as Covad and others. The costs are exorbitant and they have entered into long-term agreements.

Revenue		*Comment*
Access	*$921,672*	
AoL	*$322,585*	*This is their largest customer. The revenue shows the total base of AoL customers. If we assume 30 M AoL customers then this is approximately $10 per Quarter per AoL or $3.50 per month for access. This would change if the AoL customers were more widely spread or if AoL were to have fewer customers.*
Verizon	*$230,418*	*This is a much larger number per customer since Verizon has fewer than 6 Million ISP customers. This it appears to be slightly more than $10 per month per customer, which was the old industry standard of about 50% to backbone.*
Others	*$368,669*	
Hosting	*$133,612*	*This revenue seems to be from the hosting business, which may include Integra, their now not-supported business.*
Transport	*$98,618*	*This is the sale of excess capacity. The prices are falling here dramatically with the excess capacity available.*
International	*$66,658*	*This is apparently their international transit business.*
Total	*$1,220,560*	

The following is an analysis of the Cost of Service and gross margin. The details as above are contained within the analysis. Clearly several observations seem apparent:

(i) Hosting is a money loser. The revenue is less than half the costs. Thus they are divesting of Integra and other hosting sites.

[15] There is no way to determine the Verizon and Genuity affiliated third party transactions, but one must be somewhat suspicious regarding the nature of the agreements since both are customers and suppliers to each other.

[16] Prices for transit fees in Frankfurt for example have declined in the past year from over $400 per Mbps to less than $50 per Mbps. This is almost a ten fold decrease.

(ii) The AoL business is problematic. If the costs are allocated properly it can be seen not to be profitable.

(iii) The backbone costs are related to Verizon's network. The issue here is what costs are really being carried and at what price. Are Verizon ISP rates inflated as are the costs of the network. This is an important observation because it is endemic to UUNet, Sprint, AT&T and even MSN. They cost and revenue allocations are highly unreliable. If the revenue is all AoL and if AoL is not profitable, is Genuity paying too much for backbone from Verizon? The inherent interconnectivity of the infrastructure creates a complex set of reliances wherein costs and revenue are always at question. Why then is Verizon not paying the same as AoL. Is AoL too low or is Verizon artificially too high? In fact, it can be argued that this is symptomatic of the interdependencies throughout the industry which lead to the instabilities.

Cost of Service		*These numbers have been estimated based on the Company's summary numbers and taking industry standard cost factors.*
CO Lo Sites World Wide	*$200,000*	*There are 200 CoLo sites worldwide. The standard costs per sq ft for a co lo site is $500 to $2,000 per year per sq ft. If a typical co lo site is 500 to 2,000 sq ft, not an unreasonable number, then the cost per site is $1 million per year.*
Data Centers	*$20,000*	*Data Centers are large facilities, and typically are several times the size of co lo sites. The estimate is $2.5 million per year per center.*
PoPs US	*$185,000*	*US PoPs are again larger than co lo sites and have significant overhead which is reflected in the loaded cost. Assuming twice the size of the co lo plus overhead the cost per site per year is 2.5 million.*
NOC	*$18,000*	*NOCs are complex, labor intensive, capital intensive, and require significant overhead. They have 4 and we assume that they cost at least $4.5 million per year.*
Hosting Sites	*$325,000*	*It is not clear what these sites entail.*
US Fiber O&M	*$280,000*	*The backbone costs were $3.5 billion reduced to $1.5 after a write off. Assume that the annual network maintenance costs are 5-10% per annum of the capital base then one gets a total of $75 million up to $350 million. Based on their design it is estimated that combined US and non US are about $350 million and based on their respective circuits the costs are split as shown.*
Non US Fiber O&M	*$48,600*	
Interconnection and Access	*$244,899*	*This is nothing more than what is left after the total is collected and what we subtract based on available information.*
Total	*$1,321,499*	*CoS exceed revenue. Not a good thing. If the plant is built in excess then there may be a scale ability of revenue grows without additional capital expenditures or CoS elements. However, the opposite is the case, revenue per unit is declining while units are not growing fast enough. Thus there is an overbuild at too high a price point, the problem is no way to ever get profitable.*
Gross Margin	*($100,939)*	

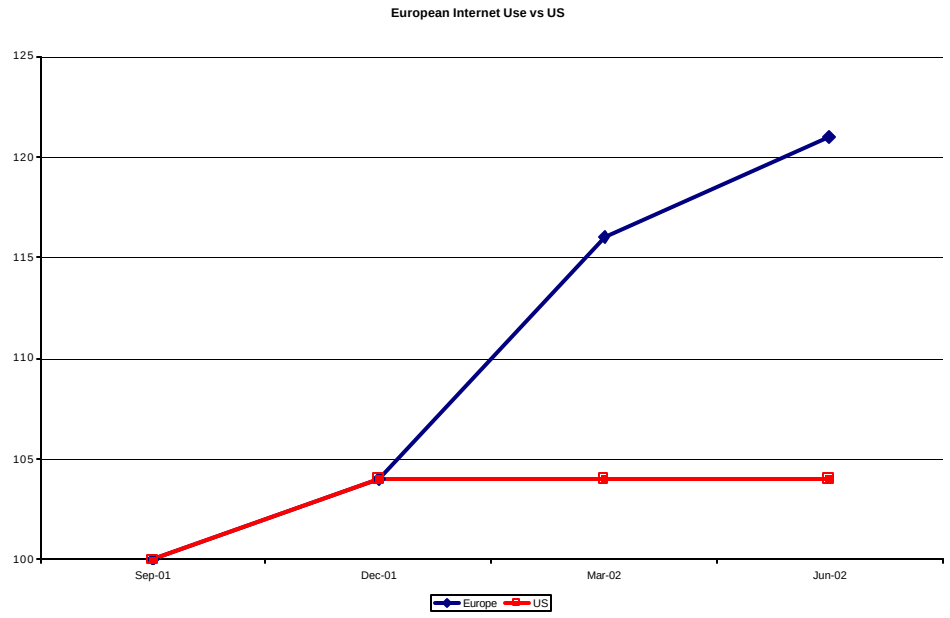
4.3 Revenue Collapse and Implications

Now the revenue issue is more critical. The facts of life are as follows:

Revenue per Mbps is dropping at a precipitous rate. In Europe, the price FOB Frankfurt dropped from $400 per Mbps to less than $50 per Mbps in six months, from December 2001 to June 2002. Similar reductions were observed in the US and elsewhere.

Growth rates have dropped from 40-150% per annum to 0-6% per annum. The figure below is from Business Week of August 26, 2002. It shows 4% US growth in Q1 and Q2 2002 and European growth of

20% in the same period. The European growth will most likely slow in 2003 to US levels. However with hyper-competition, there are collapsing prices.[17]



Thus, the revenue forecast is less than gloomy.

4.4 Other Genuity Financial Failures

The balance sheet for Genuity shows end of March 2002 cash of $744 million. There is in March a $235 million cash burn. If we project forward, the burn will likely increase to $300 million for Q2 and over $300 million for Q3, which ends in October 2002. The cash at end of Q1 was $744 million and the anticipated burn is $650 million in Q2 and Q3, we are half way through Q3 now, and the burn rate will exceed $100 million per month. Genuity is out of cash in late November! It has been argued that all other IBBs are facing similar economics.

4.5 Whither the IBBs?

Verizon has just three weeks ago announced that it ail allow Genuity to sink. Specifically it has already written off the Genuity losses. In CBS Story it is stated:

"The nation's largest local phone company recorded a net loss of $2.1 billion, or 78 cents a share. That compared with a loss of $1 billion, or 38 cents, a year earlier. The loss largely stemmed from costs related to layoffs and to a write-down in the value of its stake in Genuity. Revenue fell 1.8 percent to $16.8 billion from $ 17.1 billion, adjusted for acquired or sold operations. Excluding $4.2 billion in onetime charges, Verizon recorded profit of $2.09 billion or 77 cents a share. That met the consensus of analysts surveyed by Thompson Financial/First Call. Looking ahead, Verizon scaled back its 2002 projections. The company now expects sales to be flat or down 1 percent instead of flat to up 1 percent. Its target for earnings per share was cut down to as little as $3.05 from $3.17, the top end of its previous forecast. And Verizon said it could chop capital spending to as low as $13 billion from its earlier $14 billion to $15 billion range."

[17] Hyper competition has resulted in price collapses in Long Distance, International Long Distance, Fiber backbone, and Internet access at the IBB level. Clearly local loop has seen no such price reductions, in fact, where the ILEC dominates, such a New Jersey, the prices have increased 8-10% on average, the typical local bill exceeding $25.00 per month.

More importantly, any growth adequate to sustain the backbone providers is coming from Broadband. However as stated in Business Week:

"This time around, a retreat of investors from risk-taking could have broader impact. Start with infrastructure. Cut off from access to capital, phone and cable companies are being forced to scale back the deployment of broadband communications networks, which potentially could have enormous payoffs but require perhaps an additional $200 billion to build out nationwide."

What this means is that the opportunity to sustain the backbone providers is broadband and the current players cannot raise the capital to do so thus either we see the basic infrastructure fail or think creatively as to alternative broadband providers. This further means that capital is going to be scare and scarce capital is a threat not only for new players but more so for those in the market already. The credit rating of Verizon has already suffered. It needs more than $15 billion per year and the lack of growth in the segments where this capital is needed is a major concern.

5 INDUSTRY FACTORS FOR FAILURE

He question that is frequently asked is why has the telecommunications market collapsed. We present here a few reasons for the collapse and these reasons are also reflected in the surviving companies and may present the base for the continuing collapse. In our analysis, the causes of the current problems in the telecommunications market in the US are:

5.1 Overcapacity on backbone

There is a dramatic oversupply of backbone fiber. This results in only 2-3% of effective capacity in use, and less if one uses more advanced DWDM (Dense Wavelength Division Multiplexing) technology. This overcapacity has lead to price wars that has resulted in continuous losses. This overcapacity was a result of many factors, two being the most significant.

First, there was the unfounded optimism resulting from the anticipated growth in Internet services. What was clear from the start, however, was that if you gave every person in the United States a 56 Kbps modem, and had them on line simultaneously, then this would account for approximately 16.8×10^{12} bps or 16,800 Gigabits per second (Gbps) of capacity. This could be provided by only 16-160 strands of fiber!

McGarty, in a 1990 Harvard paper, stated:

"Fiber has revolutionized the data networks in the United States. A single strand of fiber can transmit 10^{12} bits per second of data. If we allocate each home, 100 million residences, with 100 Kbps of full time data, that is 10^{13} bits per second if everyone in the US is talking simultaneously in this high speed data fashion. That is the capacity of just a single strand of fiber. A typical bundle of fiber has 25 to 50 strands and these are connected to other such bundles. The current fiber network is structured like past voice networks, and generally does not take advantage of the bandwidth of the fiber. Albeit the technology is not yet totally operationally capable, the world view of the system designers is one that is to use fiber as copper. Use it for one voice circuit after another."

Therefore, in 1990, it was clearly known that a single bundle would suffice for usage, which was extraordinary. However, the dream for infinite capacity was based on having broadband access to the home. This concept would not want 56 Kbps or 100 Kbps, but Gpbs per home! However, this depended on the "last mile" infrastructure; the connectivity between the local hub and Central Office to the residential or commercial premises.

Second, as stated above, the last mile was the key factor. A twisted pair of copper could, even in 1990, provided ISDN speeds of up to 1.5 Mbps. In Europe, ISDN provides 2 Mbps capacity; Europe uses ISDN while the US does not. The last mile was destined to be a competition between the local telecom company and cable provider. There were many fiber-to-the-home (FTTH) trials, but with the 1996 Telecommunications Act, the RBOCs stopped them totally. They did not want to invest in a distribution

capability that they would then have to sell at wholesale (i.e., unbundle) to competitors. Thus, the RBOCs actually left millions of miles of stranded FTTH trials un-used.

5.2 Excess Debt

The carriers used high yield debt, in place of equity, to finance capital expenditures for infrastructure buildouts. The amount of such debt exceeded $1 trillion dollars. Most of it has been defaulted on.[18] This problem became symptomatic starting in 1998 when telecom companies started to wilt under the weight of their balance sheet obligations. Companies as Winstar had over $1 billion in high yield debt and were on their way to $5 billion. The other new carriers were also amassing high yield debt at a rapid rate. This debt was effectually equity financing since these companies, in an exit scenario, were not generating sufficient cash flow to provide returns to stockholders over and above the returns to bondholders.

Who created this excess debt fiasco and why? The answer is to look at the people involved in creating and raising such forms of financings. The high yield debt of the 1990's was the junk bonds of the 1980s; Drexel Burnham and all. There was no fundamental change in the debt, just increased risks and much higher numbers involved. In the 1980s, junk bonds were use to fund LBOs (Leveraged Buy Outs). In the 1990s, high yield debt was essentially used to replace equity, with no corresponding SEC (Securities Exchange Commission) oversight, leading to significant lack of transparency as well as accountability.

5.3 Excess Vendor Financing

After 1996, telecom companies raised almost $500 billion in vendor financing, which was subordinated in seniority to high yield debt.[19] Lucent, Nortel, Siemens, Alcatel, Cisco, and others provided vendor financing at rates that were very high but concomitant with risk. This form of financing was typically secondary to other debt, generally the high yield. Clearly, the payback potential on vendor financing was diminished to begin with.

The vendor financing was added on top of the high yield debt creating a totally unstable economic system. It was not uncommon to see companies with $1-2 billion in high yield debt and another $1 billion in vendor financing. The classic examples were Winstar and Teligent. Typically, vendor financing was the function of the high yield debt, but high yield debt was being used as one would use equity.

5.4 Regulatory Confusion

The 1996 Telecom Act created an artifact of a new paradigm for telecommunications regulation. However, the FCC has been without exception a failure in its regulatory management. The 1996 Act mandated competition. The key to competition in our view was two simple elements: (i) ready and effective access to the local unbundled loop and (ii) elimination of interconnection fees, also called access fees, resulting in a bill-and-keep environment. To date, neither of these key elements has been deployed. In fact, the FCC is generally opposed to these two elements for the same reasons as the ILECs (Incumbent Local Exchange Carriers) are, almost word for word. Thus, without any form of parity in interconnection and access, there will remain a non-competitive environment.

5.5 Inexperienced Management

This has been and in many ways continues to be a major problem. WorldCom was managed by good sales and marketing people but clearly missed on the regulatory and financial front. MCI, the carrier part of WorldCom, was initially a law firm with a telephone company attached.[20] That, quite frankly, was its key

[18] Most interesting is that the SEC has no control over high yield debt. The rules that apply to equity do not apply to companies using the 144A type financing. For all purposes this type of financing is the equivalent to equity, and publicly at that.

[19] See Morgan Stanley infrastructure reports.

[20] See Coll for an excellent discussion of MCI as a survivor and growing company.

to success. The battlefield is, was, and most likely will always be Washington D.C. to gain a sustainable competitive advantage. After the 1996 Telecom Act and during the infamous Internet bubble, startup telecom companies sprung up like wild weed everywhere; not many of them are around today, with more going out of existence on a regular basis. It is estimated that after 1996, over $4 trillion of private equity money went into telecom and Internet services companies; about $1 trillion of it has disappeared.

All one has to do is look across the board and see a proliferation of this; Winstar started with a few wireless licenses obtained before the auction process and called it "wireless cable", and Teligent was a group of cable operators getting the old Xerox XTEN licenses at 10 GHz which did not work in the 80s and recycling them in the 90s. Global Crossing was a group from Drexel who structured an interesting financial package and the list goes on. Telecommunications was for almost 100 years a closed quasi-religious community. It was the Bell System and Bell Labs. After 1984 when the manufacturing arm split, the hardware and software market exploded. It was latter in the 80s that the service market started with MCI, Sprint, and followed by many resellers.

5.6 Pricing Suicide:

Pricing has been a major problem with the telecommunications survival. Companies have taken any and all steps to get revenue at the cost of losing billions of dollars. The most recent example is that of Internet transit pricing. Long haul carrier companies such as Genuity and UUNet, have reduced prices almost 90% over the first six months of 2002 and have seen revenue reduce, gross margins become more negative than the revenue, and losses eat up their remaining cash at a perilous rate.[21] The impact has been a 10:1 reduction in market capitalization in the same six-month period.

During the same period, however, the RBOCs have raised their prices 15% on average, for an annualized rate of 30%, and have seen increased reductions in their operating costs. In addition, the RBOCs have regained customers lost to the CLECs due to CLEC bankruptcy. The conclusion is simple; where there is total market competition, certain new entrants will price below costs to gain market share at any cost. Similarly, in a competitive market, cash-rich players will reduce prices to squeeze cash-strapped players out of the market. Where a monopoly or oligopoly exists, pricing declines will likely be minimal.

5.7 Monopolistic Practices:

The RBOCs have been brilliant in their ability to continue to affect a monopolistic market. The political lobbying power of the RBOCs is legendary and the cash thrown by them at litigation to protect their turf seems to come from a bottomless bucket.

There are two key monopolistic practices of the RBOCs which create barriers to entry to any competitor. Both have been sanctioned by the FCC indirectly. They are:

5.7.1 Access and Interconnection Fees

Access fees are the fees charged by the RBOCs to interconnect to their network. McGarty has argued for over fourteen years that access fees must be eliminated for any type of communications competitiveness. The initial focus was on eliminating access in the wireless market. A wireless company, McGarty argued, was just another local phone company. A customer buys access from the local provider to a meet point, which the long distance provider. This service is for calls in and out. Thus, the subscriber does not pay a different amount for the ability to receive from the ability to call. Thus if one calls an RBOC customer, the RBOC should not be paid again of what the RBOC customer has already bought and vice versa. McGarty then goes on to demonstrate that the economics of access create predatory pricing in line with the violations under Sherman and Clayton antitrust laws.

[21] At the time this paper was being prepared Genuity had defaulted on their debt but was yet to declare bankruptcy. They were going though more than $300 million a quarter in cash!

5.7.2 Unbundled Network Elements (UNEs)

The simplest of the UNEs is the unbundled local loop. For telco based broadband competitors, having ready access to a loop is essential, as we are aware, COVAD, Northpoint, and others failed because the RBOC delayed in loop provisioning. CLECs failed because of loop provisioning and price. For example, the RBOC charges $14.00 per month for a loop, plus co-location space and facilities for say $4.00, for a total of $18.00. The sell services for $19.00! Thus, a new entrant could not compete. Yet, the RBOCs say that the prices they are forced to sell are only 40% of what their costs are. If one follows that logic, then the costs are $45.00 on loop alone and that they must be loosing $26.00 due to loop costs alone. In fact, if one were to take all UNEs, at the RBOC cost, take their statement that they are at 60% discounts from their costs, then the costs for plant alone for a single phone line would exceed $1,000! This logic has never passed by the regulators, and less by any of the ardent apologists from academia of the RBOCs.

Clearly in the above discussion, the use of municipal broadband eliminates the UNE problem. It does not eliminate the access fee problem. This is a legal issue. Access fees are barriers to entry, anti competitive devices used by RBOCs, theoretical constructs supported by academics on the RBOC dole, and ultimately the elements which create economic distortions via a penalty paid directly by the customer to the monopolist to support the monopoly.

5.8 Litigation Excess:

The ILECs/RBOCs have been litigating in excess to prevent the CLECs and the DSL companies from becoming real competitors.[22] Recently, in June 2002, in the case of Trinko v Bell Atlantic, United States Court of Appeals For the Second Circuit, however, what we see is the first of several examples of how customers, not companies, are fighting back with the RBOCs using antitrust laws.

The following analysis considers several of the more recent cases wherein the RBOCs have used litigation to delay the deployment of services, broadband and more standard services. One should remember that the Act was passed in February 1996 and the FCC completed the rule making in September 1996. Thus by January 1997, the RBOCs had aggressively moved to have PUCs take pro RBOC positions. The first was Iowa as shown below. These five cases start to set the groundwork for what the potential legal environment will hold.

5.8.1 Iowa Utilities Board v FCC et al, US 8th Circuit Court, July 17, 1997

This was one of the first major rulings. The 8th circuit was asked to vacate the entire FCC First Report and Order, which in essence established the details of the procedures to be followed in the implementation of Sections 251 and 252 of the 1996 Act. It was not that the FCC did a bad job; it was that the RBOCs wanted to generate confusion and delay.

In the ruling, the 8th Circuit partially kept and partially rejected the issue of what authority the FCC has over states, generally ruling in the favor of the states. The Court stated that the States and not the FCC have the prime role of rate setting. In fact, they severely restricted the FCC's ability. There was the "pick and choose" rule, whereby the FCC stated that CLECs could pick and choose elements of interconnection agreements previously agreed to by other carriers to implement their own interconnection agreement. This would give a CLEC an advantage. The 8th Circuit denied this.

[22] Some of the initial cases are: AT&T CORPORATION, *et al* ., PETITIONERS *v* . IOWA UTILITIES BOARD *et al* .; AT&T CORPORATION, *et al* ., PETITIONERS *v* . CALIFORNIA *et al* . MCI TELECOMMUNICATIONS CORPORATION, PETITIONER *v* . IOWA UTILITIES BOARD *et al.;* MCI TELECOMMUNICATIONS CORPORATION, PETITIONER *v* . CALIFORNIA *et al* . ASSOCIATION FOR LOCAL TELECOMMUNICATIONS SERVICES, *et al.* , PETITIONERS *v* . IOWA UTILITIES BOARD *et al.* FEDERAL COMMUNICATIONS COMMISSION *and* UNITED STATES, PETITIONERS *v* . IOWA UTILITIES BOARD *et al.;* FEDERAL COMMUNICATIONS COMMISSION *and* UNITED STATES, PETITIONERS *v* . CALIFORNIA *et al* . AMERITECH CORPORATION, *et al* ., PETITIONERS *v* . FEDERAL COMMUNICATIONS COMMISSION *et al* . GTE MIDWEST, INCORPORATED, PETITIONER *v* . FEDERAL COMMUNICATIONS COMMISSION *et al* . U S WEST, INC., PETITIONER *v* . FEDERAL COMMUNICATIONS COMMISSION *et al* . SOUTHERN NEW ENGLAND TELEPHONE COMPANY, *et al.* , PETITIONERS *v* .FEDERAL COMMUNICATIONS COMMISSION *et al* .

However, it then addressed the issues regarding unbundling. This is the UNE issue. The UNE issue as we have stated was at the heart of broadband. It was the reason broadband failed. As to unbundling, the 8th Circuit stated: (i) Unbundling of Operations Support Systems software and databases was approved, (ii) allowing interconnection to the ILEC at any "technically feasible" point ,(iii) denied the FCC's interpretation that any element that must be unbundled , (iv) Upheld the FCCs interpretation of the "necessary" and "imp airment" interpretations. , (v) Denied the rule requiring unbundling and affiliated combining. , (vi) Upheld the provision of allowing CLECs to purchased finished services. , and (vii) Upheld the unbundling rules in general.

5.8.2 AT&T et al v Iowa Utilities Board, US Supreme Court, January 1999

The Supreme Court, Justice Scalia delivering, in addressing the above case f the 8th Circuits, found as follows: (i) reversed the 8th Circuit in stating that Federal Law permits the FCC to have jurisdiction over the Act and its implementation.[23], (ii) reversed the 8th Circuits denial of "pick and choose" because it was clearly stated in the law, (iii) approved all unbundled access rules except Rule 319 (also 47 USC 51.319, FCC 96-325, First Report and Order), which is the necessary and impair clause. The Court vacated the rule 319, which had necessary and impair. The Courts reasoning was simply that necessary and impair were in eye of the beholder, and in this case the beholder was the CLEC not the FCC. It remanded the rule back to the FCC.

5.8.3 Verizon et al v FCC, US Supreme Court May 13, 2002

In this case, the Court ruled as follows; (i) affirmed that the FCC can set rates on a forward-looking basis. They also rejected the need for historical costs.[24], (ii) affirmed the TELRIC forward-looking coast basis for setting the rates.[25] [26], (iii) reversed 8th Circuit in requiring that ILECs combine UNEs into a single UNE at request of CLEC since ILECs have capability and control process, whereas the CLECs are helpless in the effort and may be hindered by the ILEC, (iv) takings argument was rejected.

This was in many ways a reversal for the RBOCs.

5.8.4 US Telecom Association (USTA) v FCC, Bell Atlantic as Intervenor, US Court Appeals, District of Columbia, May 24, 2002

The US Court of Appeals in DC clearly hates the FCC. This opinion reeks with abject hatred and total lack or desire to deal with any facts. It is just downright nasty. This opinion rejects the FCC re-do of the necessary and impair issues in 319 as described above. The DC Court totally rejected the FCC's efforts. It sent unbundling back again.

The DC Circuit Court focused on DSL services. The DSL companies, all bankrupt by the time of the ruling due to ILEC anticompetitive actions, has continued to block this effort. The DC Court, totally oblivious to this fact, actually states:

[23] See Chevron v NRDC, 467 US 837. The case involved EPA regulations. The Court ruled that the EPA, and Federal Agencies in general, have great latitude in interpreting the law and in fact may have the right to change their interpretation.

[24] See Smyth v Ames, 169 US 466. The case involves railroads and rate setting across state lines. The Court ruled that it was reasonable for Nebraska to set railroad rates and that a state had that authority.

[25] TELRIC, is Total Element Long Range Incremental Costs. It is a method to determine costs that are: (i) forward looking, (ii) least cost, (iii) long run, (iv) incremental, and (v) include a return on invested capital. However, like all models the input determines the output. Thus, albeit a methodology, it is not based irrefutably and consistently based on facts. It is not reproducible.

[26] See Duquesne v Barasch, 488 US 299. In this case the Court ruled that a state could set rates and in so doing did not violate the takings clause of the Constitution.

"The Line Sharing Order Petitioners primarily attack the Line Sharing Order on the ground that the Commission, in ordering unbundling of the high frequency spectrum of copper loop so as to enable CLECs to provide DSL services, completely failed to consider the relevance of competition in broadband services coming from cable (and to a lesser extent satellite). ***We agree."***

There is no competition. In fact the ILECs or RBOCs have slowly rolled out limited DSL knowing that in the long run they want separate monopolized fiber exempt from any Act provisions. This accomplished, with the help of the DC Court and their ilk, one can foresee slow broadband at extortionary rates. The DC Court goes on to say:

"In sum, nothing in the Act appears a license to the Commission to inflict on the economy the sort of costs noted by Justice Breyer under conditions where it had no reason to think doing so would bring on a significant enhancement of competition. The Commission's naked disregard of the competitive context risks exactly that result. Accordingly, the Line Sharing Order must be vacated and remanded. Obviously any order unbundling the high frequency portion of the loop should also not be tainted by the sort of error identified in our discussion of the Local Competition Order and identified by petitioners here as well."

In fact, the FCC did regard the competition, the Court has not look at the stock market and see the impact.

5.8.5 Trinko v Bell Atlantic, US Court of Appeals, 2nd Circuit, June 2002

Trinko is a law firm in New York. It tried to get some telecommunications service from a CLEC, in this case AT&T. The CLEC failed to deliver based upon Verizon's refusal to deal. The result was that the law firm sued Verizon on two grounds; violation of the 1996 Act and antitrust violations. The 2nd Circuit dismissed the 1996 Act action based on not having standing. It agreed to the antitrust action.

The 2nd Court starts its discussion on the antitrust claim as follows:

"Generally, a plaintiff can establish that a defendant violates section 2 of the Sherman Act by proving two elements "(1) the possession of monopoly power in the relevant market; and (2) the willful acquisition or maintenance of that power, as distinguished from growth or development as a consequence of a superior product, business acumen, or historic accident." Volvo N. Am. Corp., 857 F.2d at 73 (citations omitted); accord Top Mkts., Inc. v. Quality Mkts., Inc., 142 F.3d 90, 97 (2d Cir. 1998)."

The 2nd Court structures the claim as follows:

"Similarly, as a result of the alleged monopoly scheme, the plaintiff in this case had a similar set of choices: (1) stay with AT&T and receive inferior local service; or (2) switch to Bell Atlantic. While the second choice would hurt AT&T as a competitor, the first choice directly injures the plaintiff as a consumer. In this case, the plaintiff made the first choice and suffered the requisite antitrust injury."

The 2nd Court then stated:

"It is unlikely that allowing antitrust suits would substantially disrupt the regulatory proceedings mandated by the Telecommunications Act. In discussing the impact such suits would have on the regulatory process, it is useful to discuss separately suits seeking damages and suits for injunctive relief. Awarding damages for the willful maintenance of monopoly power would not substantially interfere with the regulatory scheme envisioned by the Telecommunications Act. In contrast, injunctive relief in this area may have ramifications that require particular judicial restraint."

However, the 2nd Court ruled that the suit and claim survived based on antitrust grounds. This will open up a completely new avenue for litigation against the unbundling rules. It will also further delay broadband.

The RBOCs were, and to a great degree are still, the monopolists in all markets. They set prices, control who gets what segments of the network, strongly influence the government, and use the courts, as they

have always done, even when it was just AT&T, to protect their monopoly position. All of this is done in spite of the 1996 Act and the antitrust laws.

6 AN RBOC STRATEGY STATEMENT

Verizon has clearly taken the position of aggressively staking out its position to broadband via a paper written by John Thorne, Senior Vice President and Deputy General Counsel, Verizon.[27]

Thorne begins the paper with:

"Computers make us rich. Computer networks make us richer. Very fast computer networks will make us richer still, if and when they finally get built – which will happen when the federal government steps aside and unleashes competition in the industry that now has the technology in hand to build them"

We can readily deconstruct this rather compelling statement from a corporate officer, a lawyer, and a representative of the Verizon position. Clearly, Verizon believes that having anyone else in the market is anti-competitive. The need is to task any and all restrictions and regulation off them and then they will, single handedly, solve the problem. In turn, they will get very, very rich. How can any sane person take this statement for anything but a clear call to arms by Verizon to rape and pillage the telecommunications landscape? In turn, their sole intent is "to make us richer still". We did not make this up, Thorne really said it and Verizon has it highlighted on its web site.

He goes on to state:

"Unfettered competition delivers the most when markets are young, and when technology is evolving quickly. This is evidently true in broadband markets today. Most of the market is completely up for grabs, because 90-plus percent of the technology that will ultimately be used hasn't yet been built, 90-plus percent of the capital hasn't yet been committed, and 90-plus percent of the customers aren't yet being served. And because broadband digital services will ultimately absorb and displace the old, analog voice and video, it is equally true that no player in the market today has any assurance of winning any given share of the digital market ahead. Everything is up for grabs, because an extraordinary transformation in technology has overtaken all the old certainties.

In circumstances like these, regulators should have the wisdom and the courage to stand by and do nothing. For the most part, they have chosen to do just the opposite. Telecom regulation today reaches further, and more intrusively, than ever before. And the effects are now being felt across the economic landscape. The third wave of the IT boom – the broadband wave – has not materialized…"

This is a veiled threat. Verizon is clearly saying that they are not building broadband, despite DSL efforts. DSL is the poor man's broadband. Verizon will not build broadband until it has been deregulated. That means that it can act as a totally unfettered monopolis t with no FCC and no PUC. Then and only then, will it create more wealth for itself at the costs to the consumer?

The UNE issue is clearly an element of their strategy to delay and divert. As Thorne states:

"Rather than make unbundling the direct stepping stone to deregulation, as Congress intended, the FCC has instead transformed it into a mountain of new regulation. The Commission has invented far too many "unbundled network elements," and it has contrived to price them much too cheaply. It has done this ostensibly for the benefit of small competitors that lack both the resources and the technical expertise to build their own networks. But the upshot has been a tangle of regulation that has

[27] See :

http://newscenter.verizon.com/policy/broadband/primer_c.pdf?PROACTIVE_ID=cecfc9cbc9cdcdcec9c5cecfcfcfc5cecfc7cdc8c7c7cacfcec5cf

simultaneously discouraged new investment by both incumbent carriers and by competitors that have the finances and technical ability to build out new broadband networks and develop facilities-based competition. This is not simply the conclusion of chronically over-regulated incumbents. A unanimous U.S. Supreme Court reached that conclusion in a major January 1999 ruling.¡• ‡ As did a unanimous Eighth Circuit Court of Appeals, in a key, follow-up decision in July 2000.¡§ That latter ruling is itself now headed back to the Supreme Court for further review."

As shown above, the Supreme Court has overthrown this issue. However, the DC Appeals Court has brought it back into the fray.

"Collocation rules allow competitors to squat on the incumbent LECs' real estate, for the ostensible purpose of interconnecting their equipment with unbundled network elements in the incumbents' central office. The competitors supply network equipment, but are not required to have an office of their own. The "UNE Platform" rules push things a step beyond that – competitors do not have to supply any network equipment, either."

The answer to Thorne's concern is simply to create neutral meet points, where Verizon and any competitor for any service can meet. Thus, the "squat" is not necessary. The meet point we propose is that of the head end of the municipal networks.

"The Commission has even managed to endorse a scheme under which incumbent carriers end up paying others – and paying them billions of dollars – to interconnect with and use the incumbents' own networks. This scheme travels under the innocuous alias of "reciprocal compensation." The 1996 Act required carriers to "establish reciprocal compensation arrangements for the transport and termination of telecommunications." The original idea was simple: local carrier A would have to pay local carrier B to "terminate" traffic originating on A's network and terminating on B's."

This is the access and interconnection issue. Having a bill and keep approach would eliminate mutual compensation and the significant transactions costs related thereto. Only when Verizon saw that to be the case did it start to move in that direction. He further states:

"For ordinary voice traffic, this would mostly be a wash. But for tens of millions of dial-up Internet users, the call always originates on their home phone line; the Internet itself never originates calls or phones you back. Moreover, Internet users often stay on line for hours at a time – much longer than typical voice callers."

Thus, again we have seen a tendency to not do broadband.

Thorne then goes on to attack the cable companies. This is really a feint attack, since in reality he and Verizon ultimately want total de regulation.

"There is, as a result, sharply different regulation of high-speed data services provided over phone lines and over coaxial cable. Telephone companies have to unbundle the portion of the spectrum used for broadband and do so at below-cost pricing. Cable companies do not. Telephone companies have to permit their competitors to collocate equipment to make it easier to use the unbundled spectrum. Cable companies do not. Telephone companies have to offer for resale their retail broadband transmission services at a federally mandated wholesale discount. Cable companies do not. Telephone companies have been forced to provide their broadband services through separate affiliates as a condition to gaining regulatory approval of recent mergers. Cable companies have not. Telephone companies have to pay in to the universal service regime when they provide broadband access. Cable companies do not. And telephone companies are almost completely locked-out of the multi-billion dollar (and rapidly expanding) Internet backbone market. Cable companies are not."

Cable companies are regulated by towns or local cable boards. They do not have a monopoly. At any time, the franchise can be removed. Cable is a franchise business and towns get franchise fees. They provide universal services to towns, the franchising authority. Thorne is an outright fabricator of falsehoods. He knows, or should know what the facts are but he is deliberately and malignantly distorting them for Verizon's purposes, the act of a good litigator.

He then goes on to discuss the Internet:

"The Internet backbone is currently the least competitive part of the broadband market, owned and controlled by a few companies. The Bell Companies have sufficient incentive and capital to play an important role in developing the next generation Internet backbone, but have been kept out of the game. The economies of backbone networks depend on picking up and dropping off traffic at all major nodes nationwide – missing even one creates a serious competitive disadvantage. Section 271 approval, however, occurs on a state-by-state basis. A Bell Company, therefore, cannot become a meaningful competitor in the backbone market until it obtains its last approval to provide long-distance voice and data services in the last state where it serves as the incumbent local phone company."

The fact is that the Internet backbone is ruthlessly competitive. UUNet, Genuity, if it survives Sprint, AT&T, Cable and Wireless, and many more.[28]

His final statement is another sophistry of the highest form:

"Yet, if prior monopoly status were sufficient, unbundling and TELRIC regulation would equally apply to cable companies, which are, in fact, current monopolists in the market for multi-channel video. The incumbent phone companies, however, have no "prior monopoly" in the broadband market – there is no "prior" market here at all; the market is brand new. The disparate regulatory regimes the Commission has adopted will shape the development of that market, by inefficiently shifting investment in new products and services from the heavily regulated technologies to the unregulated technologies. By picking winners and losers in this nascent market, the Commission ultimately harms consumers.

Thus, the Commission has again placed competitors ahead of competition. By extending to broadband services the entire panoply of unbundling regulation, along with the attendant regulation of price, collocation, operations support systems, and competition in Internet backbone markets, the Commission has labored to boost a host of small firms that do little more than resell the facilities of phone companies. But resale adds little in the way of new value, and the unbundling rules themselves directly inhibit the provision of functional service. It takes a lot of delicate adjustment to overlay a torrent of data on top of a trickle of voice on a mile-long strand of copper. The high-tech business of pulling together high-speed networks has been taken over completely by fractious regulators."

This is the final remark. It falsely says that cable is a monopoly whereas it is a franchise. It can be replaced or overbuilt at any time. His goal is to get Verizon's unregulated loop just that, free from the FCC and then Verizon would unbundle all of the other "junk" like any and all UNEs that any other competitor wants. If Verizon is allowed to do that then that will be the end of any competition, then and of any alternatives to access, the beginning of the control of the network as it was before 1982 and the breakup of AT&T. The only viable way to provide local open access is via municipal networks.

The Thorne paper clearly states the Verizon strategy. It can be simply stated:

1. Verizon needs "deregulation" which means that the FCC should not regulate them, it should abandon the 1996 Act, and allow them to do what they will, starting from their monopolistic base.

[28] See McGarty, Transit, January 2002 for details.

2. Verizon will not add any new plant until this new de-regulation is achieved.

3. Any other new entrant should have to build their own plant and not use Verizon.

4. Verizon is the only one really capable of doing this.

5. Verizon makes money, lots of money, from this monopoly position.

We have shown herein that Verizon does not make money from its core, in fact it does so only by means of the fees charged by access. This is in effect a tax of all other competitors to keep the monopoly player in place. Further, the 1996 Act was passed to ensure competition, and ensuring competition is also the role of the antitrust laws. Thus, the people have the right to seek remedies via these laws if the 1996 Act fails them. Indeed, this is what the people are doing.

7 CONCLUSIONS

The telecommunications market is a highly interconnected and interdependent market. It is, however, relatively well understood. It is a market, which depicts the instabilities, which we can analyze, predict, and possibly control. It is a strategic asset to the country but at the same time needs the cleansing of the competitive market forces. It is not the airline industry, which are low cost and quality restaurants on wings. It is not the energy industry where the product is transformed by then end user into additional value. It is an infrastructure and a complex living and growing and evolving organism.

For that reason policy, makers should be concerned about its collapse because they can do something about it. However, all the old tools are predicated on the monopoly player. All the new tools, dominated by litigation, are for preserving the incumbent. This, as we have demonstrated is futile, the incumbents underpinnings are rotted, its core has serious malignancies, and unless something is done, all others will support it until all collapse.

What seems to be clear is the following:

1. The FCC has not been able to understand the economic dynamics of the telecommunications industry as a dynamic system. They are micro economists at best and can address policy using the techniques of old. The telecommunications industry must be dealt with larger scale system techniques and not dated pre-divestiture academic microeconomics, which for the most part are polemical exegesis for the incumbent.

2. There must be an aggressive support of third party market clearing efforts such as antitrust litigation. This is not in any way comparable to the tobacco issue. It is being done because the regulators are not functioning and that the consumer is taking de regulation into their own hands. This is a necessary act and it is demanded by the failure of the FCC to act in this area.

3. The Government should support alternatives to network expansion. Broadband is not the sole prerogative of the RBOCs. Municipalities have been key players in this area, albeit on a small level to date. The expansion of municipal networks, using municipal bond financing, and providing fully open broadband interconnectivity is clearly a much more favorable alternative to the RBOC domination. The Thorne paper is a manifesto to retain closure. The openness of a municipal infrastructure is essential.

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9 APPENDIX 1

Model for Telecommunications Industry

We develop herein a simple model for the telecommunications industry and view its dynamic behavior. Consider three variables for a simple telecommunications firm; number of subscribers, price, and cash position.

9.1 Subscriber Dynamics

We first develop the dynamics of the subscriber market. As a function of time, intervals k and k+1, we have;

$$N(k+1) = N(k) + N_G(k) - N_C(k)$$

where;

$$N_G(k) = Growth\_Component = GN(k)$$

where G is the growth rate. And the new customers to be replaced due to churn are;

$$N_C = Churn\_Component = CN(k)$$

However, the growth component is related to the price of the specific carrier with respect to the prices of all other carriers. Namely we can state;

$$GR_i = \sum_{k=1, k\neq j}^{N} g_k f(P_k - P)$$

and we have f( ) as a monotonic function, that is if P is less than a competitor the gain is positive and if it is greater the gain is negative or a loss of customers. Churn can be caused by various factors, one being the competitor who may be an ILEC or other market conditions.

9.2 Price Dynamics

The dynamics of the price market are relatively simple.

$$P(k+1) = P(k) - aP(k) + \sum_{j=1, j\neq i}^{N} b_j P_j(k)$$

The adjustments made reflecting other prices may be positive or negative. They are established to minimize the price reductions and use information on competitor prices. The issue is that any player wants to maximize customers while minimizing cash burn.

9.3 Cash Model

The cash model is the key model and it is somewhat complex but can be simplified. Let C(k) be the cash at time period k left in the company. We assume some cash at k=0, and we could place more cash at any intermediary time period.

The we can readily show that:

$$C(k+1) = C(k) + R(k) - CoSv(k) - CoSa(k) - GA(k)$$
$$- OPEX(k) - CAPEX(k) - INT(k) - PRIN(K)$$

where these are revenue, costs of service, cost of sales, G&A, Operating Expenses, Capital, Interest, Principal. Clearly:

$$R(k) = P(k)N(k)$$

Now we can take each of these separately to show:

$$CoSc(k) = UNE(k) + ACC(k) + OCCS(k)$$
$$= C_{UNE}N(k) + C_{ACC}N(k) + C_{OCCS}N(k)$$

This shows that there are constants which relate cost of service to UNE costs, access costs and other costs of service. There may also be fixed amounts but we have already removed them from cash available. The units are costs per cost element per unit time.

For Cost of Sales we have:

$$CoSa(k) = C_{New}\left[N(k+1) - N(k)\right] + C_{\mathrm{Re}\,tain}$$

For the operating expenses we have:

$$OPEX(k) = BILL(k) + NOC(k) + CSR(k) + E\,\&\,O(k)$$
$$= C_{Bill}N(k) + C_{NOC}N(k) + C_{CSR}N(k) + C_{E\&O}N(k)$$

where we have included billing, network management, customer service, and engineering and operations.

Capital equipment consists of switches, network and other elements. These also may depend upon N(k), but we shall not include that at this time. Principal and Interest may also be the same but we shall assume for simplicity that there is no financing.

9.4 Continuous Time Analysis

The above equations could be reduced to a continuous time model. This model could also be viewed as a game theoretical model along the lines of Cournot or other types of economic games.[29] However we shall keep it in a time optimized approach. Let us assume that there are N participants. The first equation becomes:

$$\frac{dN_i(t)}{dt} = GR_iN(t) - CH_iN(t); i = 1...N$$

[29] See Tirole, Vives, or Henderson & Quandt for examples.

remember that we have:

$$\frac{dN_i(t)}{dt} = \sum_{k=1,k\neq j}^{N} g_k f(P_k - P)N_i(t) - CH_i N_i(t)$$

The we have:

$$\frac{dP_i(t)}{dt} = -a_i P_i(t) + \sum_{j=1:j\neq i}^{N} b_j P_j(t)$$

and for the cash number we have:

$$\frac{dC_i(t)}{dt} = P_i(t)N_i(t) - C_{ex}N(t) - C_{en}N(t) - C_{new}\frac{dN_i(t)}{dt} - C_{fixed}$$

we can use the above to substitute:

$$\frac{dC_i(t)}{dt} = P_i(t)N_i(t) - C_{ex,i}N(t) - C_{en,i}N_i(t) - C_{new,i}(GR_i + CH_i)N_i(t) - C_{fixed,i}$$

We assume that all exogenous costs are noted by subscript ex and all endogenous costs are noted by en.

9.5 Two Player Market

Let us consider a two player market. The players will be an ILEC and a CLEC. Let us assume the CLEC to be more efficient than the ILEC. We have the following six equations:

$$\frac{dN_{ILEC}(t)}{dt} = g_{ILEC}(P_{ILEC}(t) - P_{CLEC}(t))N_{ILEC}(t) - CH_{ILEC}N_{ILEC}(t)$$

$$\frac{dN_{CLEC}(t)}{dt} = g_{CLEC}(P_{CLEC}(t) - P_{ILEC}(t))N_{CLEC}(t) - CH_{CLEC}N_{CLEC}(t)$$

$$\frac{dP_{ILEC}(t)}{dt} = -a_{ILEC}P_{ILEC}(t)$$

$$\frac{dP_{CLEC}(t)}{dt} = -a_{CLEC}P_{CLEC}(t)$$

$$\frac{dC_{ILEC}(t)}{dt} = P_{ILEC}(t)N_{ILEC}(t) - C_{ex,ILEC}N_{ILEC}(t) - C_{en,ILEC}N_{ILEC}(t)$$
$$- C_{new,ILEC}(GR_{ILEC} + CH_{ILEC})N_{ILEC}(t) - C_{fixed,ILEC}$$

$$\frac{dC_{CLEC}(t)}{dt} = P_{CLEC}(t)N_{CLEC}(t) - C_{ex,CLEC}N_{CLEC}(t) - C_{en,CLEC}N_{CLEC}(t)$$
$$- C_{new,CLEC}(GR_{CLEC} + CH_{CLEC})N_{CLEC}(t) - C_{fixed,CLEC}$$

However, for the ILEC, two factors are different. First there are no exogenous costs and second the exogenous costs of the CLEC are revenue to the ILEC. Also there is a third factor, we assume the ILEC just looses customers and has no churn. Thus we have:

$$\frac{dC_{ILEC}(t)}{dt} = P_{ILEC}(t)N_{ILEC}(t) + C_{ex,CLEC}N_{CLEC}(t) - C_{en,ILEC}N_{ILEC}(t) - C_{fixed,ILEC}$$

$$\frac{dC_{CLEC}(t)}{dt} = P_{CLEC}(t)N_{CLEC}(t) - C_{ex,CLEC}N_{CLEC}(t) - C_{en,CLEC}N_{CLEC}(t)$$
$$- C_{new,CLEC}(GR_{CLEC} + CH_{CLEC})N_{CLEC}(t) - C_{fixed,CLEC}$$

Note that the ILEC has no exogenous costs, moreover they become revenue for the ILEC from the CLEC. Also the ILEC owns all the customers so they will just loose customers in this simple analysis. Let us further assume that the ILEC does not change prices but that the CLEC continues to drop prices. Let us further assume that the total market is fixed.

The we have:

$$P_{ILEC} = P_{0,ILEC}$$

and

$$P_{CLEC}(t) = P_{0,CLEC}e^{-a_{CLEC}t} = P_{0,CLEC}$$

We assume that the CLEC initial price is less than that of the ILEC. We can further simplify it by assuming that if the ILEC does not change prices, the CLEC then just has to price below the ILEC, so that continuous decrease is not necessary, thus $a_{CLEC} = 0$ is the working assumption.

Define:

$$\Delta_P = P_{ILEC} - P_{CLEC} \geq 0$$

Then we have:

$$N_{ILEC} = N_0 e^{-g\Delta_P t}$$

and

$$N_{CLEC} = N_0(1 - e^{-g\Delta_P t})$$

Thus for the ILEC we have:

$$\frac{dC_{ILEC}(t)}{dt} = (P_{ILEC} - C_{ex,CLEC} - C_{en,ILEC})N_0 e^{-g\Delta_P t} + N_0 C_{ex,CLEC} - C_{fixed,ILEC}$$

This is readily solved for any t=T:

$$C_{ILEC}(T) = (P_{ILEC} - C_{ex,CLEC} - C_{en,ILEC})(N_0 / g\Delta_P)(1 - e^{-g\Delta_P T}) + (N_0 C_{ex,CLEC} - C_{fixed,ILEC})T + C_{ILEC,0}$$

and for the CLEC we readily obtain:

$$C_{CLEC}(T) = (P_{CLEC} - C_{ex,CLEC} - C_{en,CLEC} - C_{new,CLEC}(g\Delta_P + CH_{CLEC}))\int_0^T N_{CLEC}(t)dt - C_{fixed,CLEC}T$$

or when integrated:

$$C_{CLEC}(T) = (P_{CLEC} - C_{ex,CLEC} - C_{en,CLEC} - C_{new,CLEC}(g\Delta_P + CH_{CLEC}))(N_0 / g\Delta_P)(g\Delta_P T - 1 + e^{-g\Delta_P T}) - C_{fixed,CLEC}T + C_{CLEC,0}$$

The question then should be, how soon is the CLEC to run out of cash in this model. What game can the CLEC play to get market share but not run out of money. This is an unbalance set of equations, each player in the game has incremental choices, some of which we have simplified away. The only choice here is that of the CLEC and the price set point. The CLEC must have a unit price which exceeds all of its costs plus those of the exogenous values. The ILEC is initially dominated by the high price and lowered costs. However, the ILEC is loosing market share and thus it is seeing the potential for larger and larger losses.

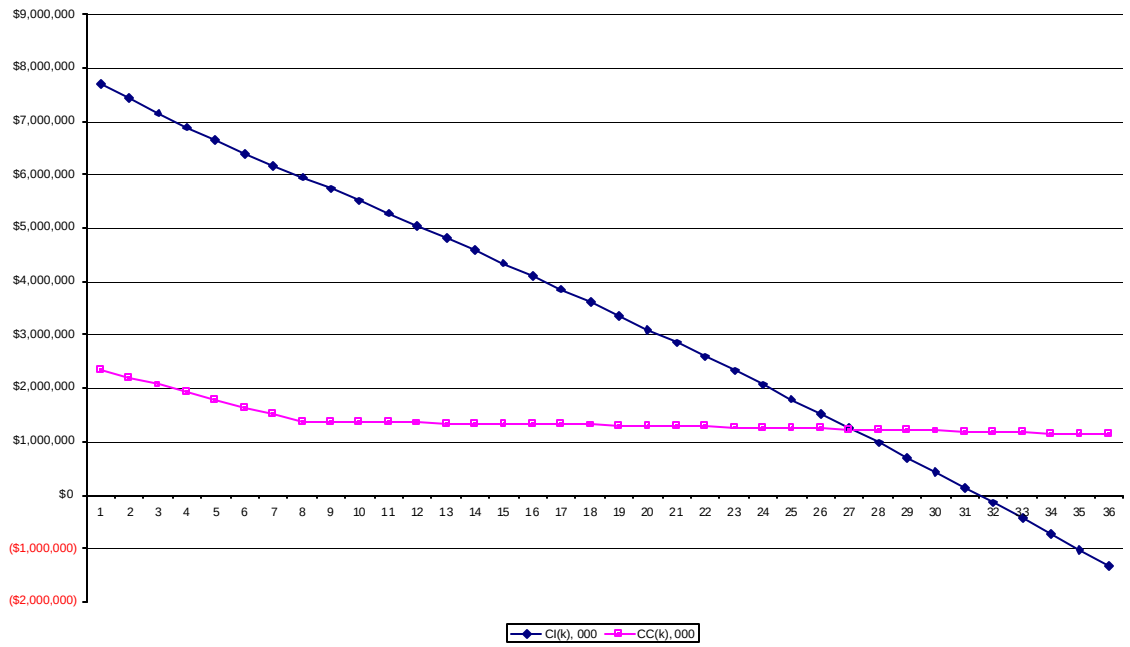
9.6 Example

Consider a two player market, with an ILEC and a CLEC. Assume that the following are the values for each player.

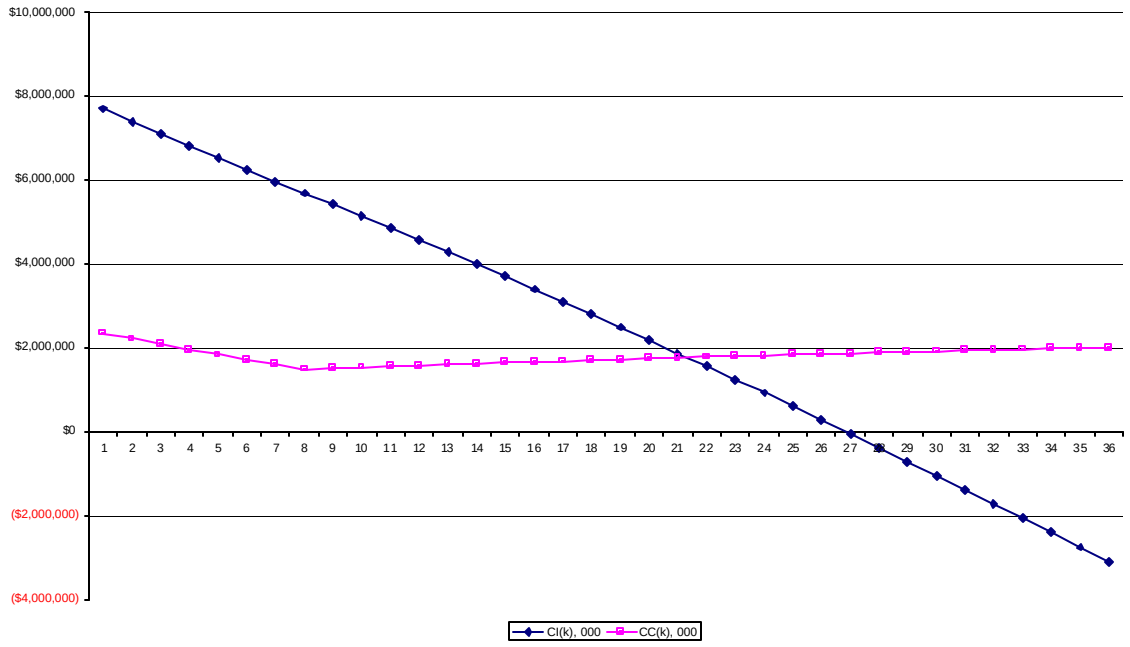
	ILEC	*CLEC*
Price Factors		
A	*0.50%*	*0%*
Market Factors		
N0	30,000	
B		
G	*0.005*	
Churn	*1.50%*	
Ops Factors	*ILEC*	*CLEC*
UNE	*$8.50*	*$11.50*
Access	*$0.00*	*$3.30*
Cost per new Sub	*$200.00*	*$100.00*
Bill	*$2.95*	*$1.85*
NOC	*$1.10*	*$0.60*
CSR	*$2.50*	*$1.50*
E&O	*$2.20*	*$1.25*
G&A	*$3.20*	*$1.45*
Total OPEX	*$11.95*	*$6.65*
CAPEX		
Switch	*$500*	*$300*
Network	*$1,800*	*$0*
Replacement	*0.56%*	*0.00%*

Now we consider two cases; case one is the numbers as shown above and case 2 id no access fee plus the UNE at cost plus return on investment. We calculate the cash position for the ILEC and CLEC on a monthly basis for three years. We assume the ILEC has $8 billion and the CLEC has $2.5 billion. We also stop the game at the point the CLEC becomes cash flow positive on an operating basis, that is we invest no new capital plant or sales, other than churn.

For Case 1 we have the following:



The for Case 2 we stop the CLEC at the point of positive operating cash flow but now with no access fee and UNE charges at cost. This shows:



Note that in Case 2 the ILEC runs out of cash in month 27 and in Case 1 it is month 32. This is a 5 month difference. What this shows is that the problem is fundamental. The game theoretic approach would yield similar results as we have developed here. This model, albeit simple, is a fairly representative model for this business. It is a cash model not an economic model. It is a model for what is in the cash drawer at the end of the month. It is the way business is now looked at. From this classic perspective, the ILEC has fundamental problems.

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