

THE NEW STATE OF COMPETITION IN THE TELECOMMUNICATIONS INDUSTRY

A ROUNDTABLE EVENT SPONSORED BY
THE NEW MILLENNIUM RESEARCH COUNCIL

National Press Club of Washington
Thursday, November 15, 2001

PRESENTERS AND DISCUSSION:

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About the New Millennium Research Council

The New Millennium Research Council (NMRC) is a non-profit research organization based in Washington, D.C. Its mission is to foster policy research focused on developing workable, real-world solutions to the issues facing policy makers, primarily in the fields of telecommunications and technology. The Council consists of independent academics and researchers who are experts in their fields. The NMRC is an independent project of Issue Dynamics, Inc. (IDI), a consumer and public affairs consulting firm that specializes in developing win-win solutions to complex policy issues.

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The New State of Competition in the Telecommunications Industry

Executive Summary

Many analysts, experts, and policymakers believe that there is a new competitive landscape in the telecom market. The New Millennium Research Council (NMRC) agrees. Today's consumers are increasingly relying on new forms of communications such as IM, e-mail, and wireless in place of plain old traditional telephone service. This has broad implications for the telecom industry.

To explore this issue in greater depth, the NMRC brought together a diverse group of academics and researchers to present their views on this topic and engage in a discussion amongst themselves and with audience members. The roundtable consisted of Gary Arlen of Arlen Communications; Joe Kraemer, Ph.D., of LECG (Law and Economics Consulting Group); and Phil Richards of Insight Research. The panel moderator was Rob Atkinson, Ph.D., vice president of the Progressive Policy Institute, as well as the director of PPI's Technology and New Economy Project.

The event began with the executive director of the NMRC, Patricia Figliola, Ph.D., providing background information on competitive challengers to traditional telephone service and how that new competition is affecting the telecommunications industry. Each speaker then provided information of his own as well as his perspective on various aspects of today's telecom environment. The formal presentations were followed by a series of moderated questions to the panel and audience Q&A.

Dr. Figliola presented three common themes to frame the discussion. First, the traditional telecom market is no more. The landscape continues to change and consolidate and will change even further. Second, these changes

can be illustrated by looking at the revenue streams of the telecom industry. Third, competition is enhanced, not only by alternative phone access providers such as CLECs and wireless providers, but also via new forms of communication, such as instant messaging, IP telephony, e-mail, and wireless.

Dr. Kraemer briefed the participants on the latest version of his Delphi study tracking trends in the telecom industry from an economic and policy standpoint. Concerning the recent financial collapse of so many of the competitive telephone companies, he estimated that, "In the best case scenario, there will be no material recovery in the telecommunications industry until at least the Summer of 2003."

Mr. Richards then discussed his backgrounder piece prepared for the day's event, "Turmoil in Telecom." He agreed with Dr. Kraemer about the current state of the industry, noting, "This is definitely a time of turmoil. . . . Competition is not the primary issue, survival is the issue."

The panelists explored various means to encourage consumer broadband use and deployment by corporations, with Mr. Arlen noting that broadband deployment is extremely important, not only for the services it can provide to consumers, but also for national security and our country's economic recovery.

Dr. Atkinson noted that many analysts assumed the market uncertainty we are now seeing would have diminished by this year, but as a result of these new services, the future promises to be just as turbulent and difficult to forecast.

A video archive of the event is available at www.newmillenniumresearch.org.

The New State of Competition in the Telecommunications Industry

Roundtable Discussion and Audience Questions

PATRICIA FIGLIOLA: Good morning. I'm Patty Figliola, Executive Director of the New Millennium Research Council. I would like to thank you all for coming today, either live here in the room, or remotely via our web cast.

The NMRC is very pleased to sponsor today's event, "The New State of Competition in the Telecom Industry." Many analysts, experts, and policymakers believe that there is, without a doubt, a new competitive landscape in the telecom market, and we agree. Today's consumers increasingly rely on new forms of communications such as IM, e-mail, and wireless in place of plain old traditional telephone service. We're very pleased today to have a group of experts to speak to this important topic.

Today's roundtable is composed of Gary Arlen, president of Arlen Communications; Joe Kraemer of LECG (Law and Economics Consulting Group); and Phil Richards of Insight Research. And our moderator for today's event is Rob Atkinson. Rob is the vice president of the Progressive Policy Institute, as well as the director of PPI's Technology and New Economy Project.

Welcome to you all.

Today's event will begin with each speaker providing his perspective on various aspects of today's telecom environment followed by a series of moderated questions to the panel and audience Q&A. Before I turn the proceedings over to Rob, who will tell you more about our panel, I would like to take just a few minutes to present NMRC's view of this issue.

Competition in the traditional local and long distance phone market, especially challenges presented by new services, has been discussed by a number of analysts. We have identified three common themes.

First, the traditional telecom market is no more. The landscape continues to change and consolidate and will change even further.

Second, these changes can be illustrated by looking at the revenue streams of the telecom industry.

And, third, competition is enhanced, not only by alternative phone access providers such as CLECs and wireless providers, but also via new forms of communication, such as instant messaging, IP telephony, e-mail, and wireless.

So to make sure that you're all wide awake at this early hour and ready to listen attentively to our esteemed panel, I would like to leave you with just a few thoughts and statistics, which everyone loves, to illustrate the three themes I just outlined.

First, concerning consolidation, some industry observers expect the telecom industry to consolidate much like the airline industry, resulting in four or five major players, a few regional competitors, and some niche companies serving specific market segments.

Of course, continued consolidation will have an effect on revenue streams, our second theme.

In October, a Lehman Brothers equity research report on a long distance provider stated that

"revenue declines continue to reflect falloff in volumes as consumers substitute e-mail and wireless products for traditional wireline services." Other reports have noted that one RBOC attributed nearly a 3 percent drop in local minutes from first quarter 2000 to first quarter 2001 to consumer's increased use of wireless, e-mail, and dedicated digital services. And another long distance provider's revenue dropped a little more than 13 percent, and profit dropped an almost unbelievable 88 percent from 2000 to 2001 due to the substitution of e-mail and wireless as new primary means of communication.

Third, competition has come from both expected as well as unexpected directions. A recent Morgan Stanley report stated, "we expect total RBOC residential line growth to be negative in 2002 given churn off second lines, and substitution to wireless and cable telephony." Also affecting the long haul carriers next year will be increased substitution at the consumer level to other voice service providers, including RBOCs offering long distance service, cable telephony, and wireless.

So just how many consumers really are using these new services? Well, 97 percent of online consumers send e-mail; 51 percent use IM; and 27 percent use chat rooms, all via a local call to their ISP or via their cable modem or a DSL line.

Considering that the numbers of consumers using the Internet is growing every day, these are not insignificant figures.

Just a few more interesting statistics to further set the scene, and I'll let Rob get on with the panel, there are about 77 wireless providers serving 110 million U.S. customers, and 30 percent of those users have considered abandoning their landline altogether.

Moreover, for every new wireline connection, nearly four new wireless connections are made, and almost 61 percent of U.S. households now have at least one wireless phone, up from only 36 percent in 1997. E-mail is also, in case no one noticed, taking over our lives. At last tally, more than 160 billion e-mails are sent every year in the United States, and those are surely replacing some of the many average number three-minute calls that are taking place. And consumers are also sending instant messages at an ever-increasing rate. Today, more than 850 million instant messages are sent every day.

Finally, slowly but surely, voice over IP is also increasing. Although the figures vary, it seems international usage has jumped from about .5 percent to about 2 to 4 percent in total usage in the past two years.

ROBERT ATKINSON: Well, thanks, Patty.

Before I introduce the speakers today, this issue reminds me that we have a report coming out at PPI in about a week on postal reform.

One of the things that's going on in the postal arena which is very clear is substitution between mail and electronic forms of communication, and that trend is continuing. It's going to grow, and whether it's leading to an absolute decline, it certainly is leading to a decline in growth of mail and related revenues.

I think that's what we're seeing here in the telecommunications industry as well -- a substitution away from voice communication, at least voice communication over wireline, towards something else. Some of the key questions are, how big is that, how powerful is that, and how likely is it that it is going to continue. The second key question is what are the real implications for both for the competitive

position and structure of the telecommunications industry, particularly whether it's having a greater impact on the long-distance providers, the local providers, or both. Secondly, what are the implications for competition, which I think, are critical questions to ask.

I think it's a very timely program today and we really have an excellent panel this morning. Let me read you the bios of who we have here. On my left is Gary Arlen. Gary is president of Arlen Communications, Inc., Bethesda, Maryland, a research consulting firm that is known for its insights into the converging and sometimes conflicting worlds of interactive media, telecom and program content. For 20 years, Gary has accurately analyzed the use of new media and telecom technologies forecasting the evolution of consumer controlled video and data services. He's published future-looking periodicals; he consults for clients seeking strategic guidance in these fields. He is also a founder of the industry trade organization known as the Internet Alliance, and he's on the board of advisors of the Media and Society Program at the University of Maryland. He's also on the board of directors of NTM Communications. Finally, his writings are published in a number of trade and industry journals, and his commentary appears widely in the business and consumer press.

Next, Joe Kraemer is here on my right. Joe is director of LECG, LLC, a consulting firm with expertise in capital-intensive industries undergoing structural change, including the telecommunications industry. He has worked with senior management in communications and high tech companies in Asia, Europe and America, speaks regularly at conferences around the world, and has been an expert witness for regulatory and legislative forums. He is also quoted frequently in major publications and trade press. His recent publications include *Competition Policy: Local*

Telephone and the Local Telephone Industry; Beyond the Network: E-Commerce Opportunity for the U.S. Telecommunications Industry; and Global Telecom Trends: A U.S. Perspective. He is currently working on an Assessment of Strategic Trends in the Telecom Industry. He also serves on the faculty of the Georgetown School of Business and the Kogod School of Business at American University.

Phil Richards is vice president and program project leader for the Insight Research Corporation. He has more than 30 years experience in the telecom industry. Prior to joining Insight, Phil was vice president of Marketing for TransSwitch Corporation, which was a maker of high-speed VLSI devices for ATM communications systems. He also managed strategy development for the Rolm Corporation. He was with Western Union, where he served as vice president -- assistant vice president corporate network systems. He also served as director of telecom strategy development at ITT, and he began his career at Bell Labs.

His recently published research includes *DWDM Sonet and Photonics: The Emerging All Optical Network 2001-2006.* He is completing work on broadband access, DSL and cable modems 2002-2007, and a follow-on report to his 2000 report, *DSL v. Cable Modems: The Future of High Speed Internet Access 2000-2005.*

We're very pleased to have such a distinguished group here this morning, and we'll start our morning's program with Joe Kraemer.

JOE KRAEMER: Good morning. I'm glad to be here. I will use transparencies so that you can follow along with me.

I'm going to walk briefly through my paper. You should have picked it up outside; it's a summary of strategic trends in the industry. It's a Delphi-

type of study in which I set out what the trends look like, and knowledgeable people responded with comments.

At this point, we've had over 50 senior executives comment on the paper. Now, you may say, what's important about that? Well, the important thing is that the people who are commenting are the people who are making the decisions. So to the extent that it is their personal opinion they're giving, to the extent that they make decisions consistent with their opinions, then to some extent this is a self-fulfilling prophecy. You can have all the Ph.D.s in the world comment and give great ideas, but the people who have essentially commented here, are the people who are making decisions to make things happen. So you might give it a little more weight than a typical white paper.

Now, by the way, if any of you would like to provide an opinion, just provide it by e-mail. This is still an open study. We've had several CEOs directly comment, one FCC commissioner send input, and so it is a living document. What you're seeing is something that is in process, feel free to comment, either as part of the Q&A or send me an e-mail. Let's just walk through it. Because you can read it, I'm not about to read you the slides. I'll just pick out some of the high points for you.

This began, essentially, in August, prior to 9-11, although now 9-11 has influenced some of the outcomes. And really the issue that was first on the table was when might the telecom industry begin to recover? And as you can see here, the thought process, best case, summer '03. Now we're sitting here, fourth quarter '01, so you're talking essentially six quarters out.

Based on comments, the theory is that the U.S. economy will recover in late '02, and telecom will trail. So to the extent the U.S. economy doesn't recover, the thinking is the telecom industry will lag. We have had people come

back with '04 and '05 as the recovery point. So it's kind of an interesting situation, but, once again, recovery '03.

Now, obviously, from a decision maker's point of view, if recovery is coming in summer '03, you begin to position yourself now as you head into '02. If you feel recovery is in '04 or '05, you basically hunker down. The critical issue here is how decision makers view the economy. Investment decisions have lead time. You can talk about all the services you want, and about demand, but in the absence of investment, in the absence of risk taking, willingness to take risks, in the absence of funding of innovation, you are not going to see mass market services until folks are willing to take risks and begin to invest.

The kind of logic that emerged in the study was that there was a period of supply push in the late '90s, a lot of investment particularly in networks, all types of networks, intercity, intracity, and in fact the supply of installed network capacity exceeded the demand in the short-run. So what happened was that we reached kind of a point here where we got a supply/demand imbalance. Until those begin to come together, we've got essentially a sideways movement. If you just look at the chart, they peak out in '00, probably in the first quarter, and the thinking is you begin to recover in '03. Of course, this is the period of opportunity and challenge. Your aggressive companies will invest, assuming they work backwards from an '03 recovery, once again, '02 is when you begin to make your moves in terms of investments, in terms of acquisitions, et cetera. But this is where we are, and we're in that negative period right now.

Just to reinforce what Patty said about revenues, here's your nine months, '01 versus '00, for the seven largest telecom companies in the States. What do you see? Basically, you see it's relatively flat, although in aggregate

down. The percentage in aggregate down for that group is one percent.

Now, you say, well, that's not bad. Well, the problem though is it was up at 6-month, so all of the drop occurred in the third quarter. To the extent the fourth quarter, which is not necessarily the best in this industry, is worse than the third for the year, that percentage will come down. Now, this is a fixed-cost industry. You've got employees, you've got depreciation, you've got networks, so by definition as revenues don't grow or go negative, the bottom line suffers disproportionately. Also, your stock price suffers. If your stock price suffers and you're a CEO, you do not invest.

What's going to happen in the carrier segment? Well, Patty, I think, mentioned some of this. For example, distinction between local and long distance goes away. Interestingly enough, one of the thought processes after 9-11 is that this country can't afford to have a lot of little tiny networks; basically you need a limited number of robust interconnected networks that have a high probability of survival in the event of natural or manmade disaster. This argues for a consolidated base of carriers operating with agreed-upon disaster protocols. That argues against having a whole series of relatively small type carriers interconnected in various ways using different standards. But basically what you're looking at is consolidation, similar to the airline industry, as Patty said.

So who survives and thrives? RBOCs. And if you really go back to '84, you can argue that the U.S. government created the long distance industry, and it was artificial. In reality, customers do not distinguish local vs. long distance, that kind of break point doesn't really exist. Now the pressure is on the artificial inter-exchange carrier industry to basically disappear, be merged, be absorbed, whatever.

So one of the questions, of course, then becomes, what happens between RBOCs, will we have competition? Particularly, RBOC executives say, "yes," it will intensify as consolidation takes place and the RBOCs become national and global full service providers. There is another dissenting view, equally put forward, that RBOCs will use the regions as fortress hubs to not compete, and that's the plight of oligopoly or other folks say side-by-side play.

If the RBOCs consolidate, where is the source of competition? And it appears to be surviving CLECs, mobile wireless companies, and cable MSOs, that is, cable companies essentially, in residential and small business markets. Interestingly, though, the cable industry is a little bit of a wild card; it could upset the balance. In other words, if cable moves more aggressively into voice and high-speed data, that could trigger some fairly intense competition locally.

With respect to the CLECs, we should have the lights go down and Taps played slowly in the background. But, of course, lost in the noise, a strong demand remains for an alternative local service provider to an incumbent local exchange carrier. So, there is a demand there, the issue is how do we meet it? Surviving CLECs will be facilities based, maybe with some degree of leasing of loops. Survivors will function as regional or niche providers, not as the integrated services providers. Remember back to literature two or three years ago, we were looking for the CLECs to be the equivalent of greater than RBOCs. That is over. They'll be very powerful competitors, but they will be competitors where they were circa first quarter '00. In other words, wherever they stopped their build out. Some CLECs still have cash and can build their business base where they will compete. It doesn't mean that you won't

have high degrees of competition in New York and Washington from CLECs, but they're not going to be big, national companies.

What happened in the first phase of the CLEC industry? Too much capital, too cheap, bad business plans, poor management, the RBOCs really were not prepared to have lots of small companies interface with their systems, inappropriate regulatory theories and actions. The net results are bankruptcies, litigation, and the collapse of investor and community confidence. So like I said, play Taps.

There is some move to save the CLECs, and all that will do is delay recovery and cause distraction. You cannot resuscitate the dead. This is important for network equipment manufacturers and professional services firms. But basically, the buying communities for equipment, for services, for software, have substantially decreased. In the end, you're going from 100 and some companies down to 12, 15, or 18. All of the tech companies that were supplying network equipment have to shrink drastically, and they also have to change the way they do business because the companies that remain will have very long, intense procurement cycles.

Then a category that will be of interest, I'm sure, as the morning goes on, high-speed Internet access. It's going to miss its forecast, below the original 2001 forecast. What happens with forecasts is, we keep adjusting them to the point where they're always right. Have you ever had a wrong forecast? I can forecast it for the end of this year, and say I'm right on target. Well, of course. The issue is, who made a forecast a year ago, what was it, and was it correct? The answer is we're missing the industry consensus of one year ago. And that's important.

Year 2000 FCC statistics say there were 5.2 million high-speed, meaning 200kb or greater,

connections in the United States at year end, with a two to one advantage by cable modems over DSL. But you're going to miss, and you may well miss '02 and '03 projections. Of course we can forecast at the end of '01 and make them. That's easy. But let's go back to some of the things that drove build out of the factories that are making the equipment. Consensus was 11 million, but we'll probably come in closer to between 8.5 and 10 million.

The real issue here is availability versus take rate. The question is, do we have a shortage of broadband capability or do we have a shortage of demand? That's important because, of course, you could have regulatory or other actions driven by how you decide. Of course, where we are on this is some questions about whether it's "content" versus "connectivity." The reality probably is the near-term demand for high-speed access has got to come from existing content applications. Once you begin to see increasing availability and access at high speeds, then you'll have more creative content, which is a "virtuous circle." Regulators and policymakers are debating, is this a market failure, is it typical at this point in time, is it that we need a federal industrial policy? A subset of a folks think that would be a good idea, and that's driven by the fact that the market has failed to get high speed access out there.

Continuing on the theme of high-speed access, it's not just an isolated discussion because you've got to deal with the conventional wisdom, that high-speed access will affect the economy favorably. Remember all the themes in the late '90s that talked about how this type of activity drives the economy. In the event terrorist activities, now here we are, 9-11 comes back, results in quarantine restrictions on personnel movements. This comes from somebody in the government who said, by the way, we have contingency plans that we can quarantine cities, or we can quarantine sections of cities. Well, that's a great idea. That's when

I went to Giant and stocked up on food. But the issue here then becomes personnel movements will be restricted, and then you could work from home, or at cleared central sites. Well, the implications of 9-11, when you begin to work it through, infrastructure and the like gets to be significant.

The current regulatory dispute, of course, as to whether RBOCs unbundle is critical. The issue is, as telephone companies stop deployment of high-speed access capability fiber into the neighborhood in order to get this straightened out, they default the market to cable, and then they have to engage in "take back," which is more difficult. This issue of the ultimate killer infrastructure is fiber, fiber to the neighborhood, fiber to the curb, fiber to the home. That's all going to get slowed down.

What's the killer application? Video of all types. But primarily, in terms of the standard type of application, some of them are business oriented, some of them are entertainment oriented, some of them are communications and community oriented. Video, of course, is increasingly and very much accepted by people under 30. So there is no doubt as they age, the demand will go up and dominate the market. That's a long time coming just waiting for baby boomers to die. So this has got to rollout faster, but it requires infrastructure. Once again, going sideways, particularly when people are scared to invest. I think Gary Arlen will pick up on some of this. The interesting thing, of course, is as you move towards video, you move towards people like AOL and Microsoft getting into the communications business. Up until now, we've traditionally talked about IXCs and CLECs and ILECs, but now we're getting into new actors because as you change the content and you move away from traditional voice, you obviously change the suppliers.

And wireless is a critical piece. Expectations are for wireless data going slow, slower than

some of those projections circa '98-'99, 3G spectrum is tied up by broadcasters, and the federal government, and of course, you're not going to move the feds now out of the Department of Defense zone. I don't know whether you know it, but some of the spectrum to be used for 3G is used for smart bombs, so precision munitions are keyed in on those frequencies. This is a drawback if you use your cell phone, particularly out in New Mexico where the bombing ranges are located. Basically that little bomb will be following your vehicle, so this is not a good idea. So there is a concern about use of these frequencies.

The issue of the wireless data business model is a big issue. Are we in a traditional model where we provide an open platform and get paid really on usage? Or does the industry use a transaction model where the carrier gets part of the revenue? Until carriers resolve that we're kind of stalled. You can see this really affects earnings which in turn affects the ability to project forward as to why a carrier should invest in 3G.

Going back to networks, and this is the wired networks, we had a surge in network construction, '96 through the back end of the year, now we're going to basically come down to more historic levels. We're really going to be focusing, from an investors' point of view, on achieving the ROI that was in the business plan that justified borrowing all that money. The deployment of next generation carrier network technology is going to be delayed. There is a surplus of existing technology out there, folks selling the stuff, never been unboxed. So why am I going to take a risk on a soft switch when I can get a Class 5 at 20 cents on the dollar?

We have home networks, a lot of comments on the home networks. What's that going to look like? The expectation is, when people really get broadband in the home, they will then want

to put broadband, have broadband, and pay for broadband in the loop.

Economics dictate migration into a single packet-based network, not the parallel mishmash of networks of today. IP telephony is more economical, cost savings estimated 30 to 50 percent. VOIP (Voice over Internet Protocol) does work in favor of non-conventional, non-traditional suppliers such as AOL and/or Microsoft. You can see here VOIP can be adopted by large businesses, small businesses, residential, all for different reasons. And for residential customers, most likely it will come because they buy telephony from their cable company, although you still have the consumer resistance to the concept of making a 911 call over a cable connection.

Technology is important, and the effects of the slowdown are largely invisible. What we've got here is a situation where R&D is not being financed. It has a lag effect. The commercialization pipeline for products and services in '03-'05 is going to be interrupted, there's going to be a void. You may get a new color case on your computer or something, but the real guts, the true investment, commercialization is being backed up, and then also radical innovations that take 10 years to be commercialized, well, there's not any chance of investment there. It's probably down to less than 10 percent of what it was four years ago. The venture capital community is not putting any money in here due to declining demand for the technology, and no viable exit strategy. Are we going to have IPOs. . . yes, no? With 15 companies dominating the industry, who is going to be the buyer?

So small independent technology companies are getting hurt, and this is something that's very, very difficult to measure. Most people agree that it is occurring. In the long run, maybe more significant than anything else that we've talked about, particularly for the U.S., will

be the decline in innovation in the telecom and technology sectors.

Regulation/deregulation -- what happens? There is increasing strength behind reregulation. We've never truly had deregulation. We've always just had less regulation to some extent, or less onerous. State and federal regulators who have commented are developing a theme that the market-based solutions have failed. We all believe in a market, but in this case it's failed. We have to go in, and we've got to fix it. Always a scary thought depending on your perception of the ability of the public sector to fix market-based type issues.

Some regulators say that the low take rate by small business and residents for broadband indicates lack of availability or overpricing. Other issues include under-served rural and low-income areas, lack of spectrum for 3G, digital television taking too long to implement. What we see is a tendency, now not by Mr. Powell there at the FCC, but at the state level and on Capitol Hill to some extent, to push regulatory solutions to market problems.

Foreign carriers investing in the U.S., very low probability. They made some money here, but they've got their own problems back home, so it's not like BT, FT, DTAG are going to come in and make a difference. We're all where we are, and we're going to have to fix it ourselves.

And that is it, it gives you a little food for thought. So, now I'll turn it over for the rest of the panel.

ROBERT ATKINSON: Thank you, Joe. That was a tour de force of where we are. Now I'll turn it over now to Phil.

PHILIP C. RICHARDS: Thank you. I thought I would just talk to the issue instead of using slides. My concern at this point of the industry

in total is that competition is not the primary issue. It's survival. And survival is not a problem that has just occurred because of any recent events. The problem is the evolution of technology; the evolution of the business structure has reduced the value of communication services tremendously. One of my problems is, we've got a \$250 billion industry that may face a revenue cut by as much as 50 percent. And the reason, simply, is that the ability to provide these traditional services that we're familiar with has gotten extremely cheap.

Joe mentioned the end offices going at 20 cents on the dollar. Well, that compares with the rest of the network infrastructure that all of the carriers have invested in that's going for even less than that, because the newer approaches to providing the services are so much more efficient. I would say that if you remember the large installations of long distance switches, they are totally irrelevant at this point. You can do the same thing for less than 10 percent of the cost there used to be for these systems.

So where is the survival going to go? Yes, the RBOCs will probably survive, I agree with Joe on that. Their problem is that they're really not prepared for the new environment. They have a revenue base of business services that's perhaps nearly two-thirds of their revenue, and one-third comes from residential business. Of that business revenue base, a very substantial portion of it, perhaps 40 percent of that business revenue base comes from T-1 services, and T-1 services have been threatened for quite a while by the lower cost of DSL offerings. The only reason that T-1 is still the cash cow that it is is the lethargy on the part of the telecom managers to move to lower cost solutions. Indeed, the primary threat that the CLECs provided to the RBOCs was to erode their T-1 business much more rapidly than it would otherwise.

I think that today we're faced with the CLECs being a non-factor, and that this business will just have to go away from other threats. At the same time, the IXCs have seen a major drop in long distance revenues. This is also a technology issue, it's so much cheaper to handle long distance now than it was many years ago, and to see the revenue going down shouldn't be a surprise when you're talking about rates that have been cut by a factor of 70 percent over the past five years. I hope all of you are getting five and six cents a minute telephone long distance service, because that's certainly the going rate for an individual user, and large corporations pay a lot less.

To my mind, the fundamental cost for long distance is down around a penny a minute. So that the real threat to the industry is that the revenue will start to move toward the cost base, and you have an industry that is shrinking dramatically. To answer this, of course, there has been a turn to using broadband services, but there's a fundamental problem here. The revenue received from data type services is typically about one-tenth of the revenue that you receive for an equivalent bandwidth of voice services. So that as we see the network moving to where data is equal to voice today, and maybe even a little bit more, and then data moving up extremely rapidly over the next five years, the problem is the revenue source is now moving to a lower value service.

What happened in the last couple of years is to me an anomaly. The basic user demands for services are not changing that dramatically. The growth of high speed Internet access is continuing pretty much the way it was. I don't think it's slow. I think it's growing, and in the middle/early stage of a new service, it's growing rapidly. I just noted yesterday the cable people said that they had added another 850,000 high-speed cable modem services in the third quarter of this year. So that's continuing to move forward.

What happened to this industry is that it got caught up in an investment debacle. If you think back over the entire decade of the '90s, the cable TV industry was able to invest heavily in upgraded infrastructure over that entire period, using a valuation scheme that was based on EBITDA as opposed to a real net income. The result was that they were able to build up a very substantial network of capability. The CLECs came along and tried to use that same mode of investment where the industry would look to them to invest heavily in build up a network, and then move into a place where they actually started earning a real net income.

The Internet bubble burst right in their faces as they were building up on this program, and they were faithfully following what their investor wanted, but the investor turned against them and, of course, that turned to a complete wipeout of the business.

What I see as the future of the business is a very difficult environment for even the RBOCs to do well. Consolidation is absolutely going to happen, but the industry has to face up to the fact that it's a much lower cost to build an equivalent network and, therefore, the revenue base is going to shrink.

How that happens through the investment community is a big question. I firmly believe that the user demand and the willingness to use higher speed services is still there and is still very active, but they're used to paying very low prices for it, and they're going to continue looking to pay low prices for that service. I think this is going to be a very interesting discussion to see all the viewpoints on this issue.

Thank you.

GARY ARLEN: I thought I'd start with a quick Delphi. It really connects to the issue of the big topic that we've talked around so far.

How many of you in this room have a mobile phone, PCS or cellular -- any kind of phone? I suspect everyone should raise his or her hand. Now, how many of you love the service that you have, you absolutely don't care about the drop-outs, you don't care about the signs that say no service? How many of you love your mobile phone service? You'd better raise your hands. So we've got two out of about 20 who raised their hands.

Two other questions, how many of you would give up your mobile phone. You don't like it, but how many of you would give it up, throw it away? Nobody. One guy, okay. This goes in track with what I've done before.

A couple of more questions. How many of you are on your fourth or fifth provider of mobile service? Come on, raise your hands. Usually the number is about 40 or 50 percent. And finally, how many of you would pay \$20 to \$50 more per month for the mobile service? Okay. Again, same hands go up every time.

Very consistent with what I've heard before. Now, a quick analysis says, you've got it, you can't live without it, you've gone to a "less bad" provider, you all have said, except for you, you don't love the provider you have right now. So you've gone to a less bad one, even though you're not getting great service, and even though it's a tax deductible business expense for everyone in this room you don't want to pay a whole lot more. Therein lies the problem for services like 3G, which obviously are a different product than the voice-based services we have right now.

I've done this ad hoc poll, not very scientific, with very similar results in groups like this, 100, 200 people, high tech, so it's always very savvy, no fear about using it. But the issue is it reminds us about what the demand side of this equation is going to look like. Now, what we've heard a lot about here is obviously the supply

side, and what the issues are. But the customer, both the enterprise, and especially the fickle residential customer have a lot of problems with where this is going. I want to put a lot of that in that context, because as we talk about these issues, and Rob, in your introduction, you alluded to the fact that this is very policy driven, that's why we're here. From the side that I look at this business it's very technology driven.

I work with companies in which they have a great idea, they enter this business, there's 25 people there, 24 of them are engineers, they have a receptionist or someone who is not. But there are no marketing people -- if there is a marketing person, he or she is also an engineer! There are a lot of issues on how the technology drives this, and yet as we look at this it is very much a market driven project, as you get into what is becoming a mature industry. Telecom delivery is a very mature industry, and one that's obviously very competitive.

I was impressed with what Joe said. I hope that was one of my contributions to the Delphi he's done, as I've looked through some earlier iterations of that. So far we've talked about voice and data, which is really what's driven the industry so far. But as you look at the user, the demand side of this, I tend to call them "viewusers" -- viewers and users combined. As you look at Gen Y, Generation Y, even younger than the audience that Joe alluded to, born since 1970, really kids born since 1978, '79 or '80, kids who are in college right now, you start to see these are folks who rely on wireless. They live wireless. Some of the points in the paper so far talk about how wire line users have a certain set of expectations, and yet if you look at Gen Y, and we've done quite a bit of research on this, they are walking around with a phone all the time, they don't care about minutes, usually because their parents are paying for them. They really use wireless in a

much different way than the incumbent audience. We want to look at that.

By the way, this whole issue of users, as some of you know, only two industries call their customers users, the Internet and drug dealers. The core issue here is that these are both very addictive products, take a little free sample, we'll give you a few free minutes. The point is, a very interesting way to look at how these products and services are marketed.

One of the points made in the handout is how these industries grow. As Joe pointed out, cable modem deployment outpaces DSL deployment right now by about two to one, about 67-68 percent for cable modems. Wireless and satellite delivery is just starting to come into the market, in very tiny portions. Some of this data, in greater length and depth, we've compiled for the Telecommunications Report Online Census which we do quarterly.

I moderated a panel at the cable TV convention about four or five months ago, and the hubris of the cable people -- very self satisfied that "we've got 68 percent of the installed base right now, in the next few years we'll grow to 80 percent because DSL is a loser. CLECs, DLECs are gone, it's ours." They declared victory. Now, let me think of the four people who were on that panel with me. We had the founder and executive vice president of @Home -- in bankruptcy. We had the founder and president of a company called High Speed Access, cable provider -- out of business. Let's see. We had an executive vice president from AT&T Broadband. Let's not even go there. Finally, of all things, the president of Road Runner, and who'd have thought -- he's the only guy left standing out of that panel!

This goes back to the issue I want to get to on the other side of the sheet, which is this convergence of businesses. Moving to the supply side for just a moment, Road Runner,

the provider for a company called AOL Time-Warner. He's got a natural audience, and in that value chain I presented there, you look at it and you see the real winners in that value chain are companies that provide two or more segments of that line up.

In the case of AOL Time-Warner, obviously a very strong programming company. They own 31 million customers, about 20 percent of whom are overseas. They have very strong customer relationships. You add to that -- they what I would call the Harry Potter audience this week. Think of this as one of the first synergies that has worked in that AOL Time Warner alliance. If you are an AOL user, you see the Harry Potter pop ups everywhere you go on the service. Obviously Harry Potter is -- has anybody here not heard of Harry Potter, it's a big movie, it's going to open tomorrow, and it has the biggest pre-sale sold through Movie Phone, another AOL Time Warner company. It just shows the value of this kind of integration through the industry on the supply side. So I think we'll see a lot more of that.

You also have some other issues here in this value chain, which I think are intriguing to look at, but we don't know where they're going yet. Things like at the very end of that arrow is the set top box -- "the STB" -- the consumer electronics device.

Back when the Baby Bells were trying to get into the TV industry -- remember Americast or Tele-TV -- they talked about the television set as CPE. Now, no one in his right mind in the consumer industry thinks of a television set as being a customer premises equivalent. It is, but it's not sold, it's not presented that way, it's not part of that legacy. Stroll down memory lane, if you'll indulge me for a moment, back to this point about integration. I remember when there was talk that Bell Atlantic, some of you may have heard of them, was talking about buying Columbia Picture Studio, or when the Tele-TV

guys thought they were going to be program producers. I can't imagine a district manager running a Hollywood studio. I mean, it goes to some ideas. It goes to this idea when they used to be telephone operators. There was the thought that the Bell companies can train their employees to do anything. If they were going to make a movie, they'd just take operators, send them to dancing school, and they'd become ballet dancers.

But the issue is these are companies that are ill-equipped, and that's why partnerships and alliances, the kinds we're seeing in these industries right now, plus the presence of companies that are not telecom companies, who are really in a position to call the shots or set the direction for this. Microsoft, absolutely. Its \$5 billion investment in AT&T Broadband didn't get it anything. It finally got a deal with Charter last week, which is a very interesting one, for the middleware of this value chain. Certainly, AOL Time Warner has bought into a lot of this. Other players, whether it's Yahoo, Disney, even Real Networks, which is a questionable player of long-term presence in this, but nonetheless, these are companies that are setting up this infrastructure, and you look at this, and the relationships that these companies have with consumers, and you start to say, this changes the simple equation of a fight between telco, cable, and maybe satellite.

Other wildcards, what's going to happen with Echo Star? What's going to happen if Murdoch challenges the Echo Star deal as it exists right now? Part of this equation is the transaction processing. Companies like Visa, and Discover, and every bank, and many other companies that have consumer relationships are part of this equation. Certainly, the Bells have billing relationships that can play an important part in this, if they can leverage that. So you look at issues like pricing, you look at some things like the deals between Sony and AOL Time Warner that was announced this

week, it's a CPE deal in the language of telcos, but more importantly it has immense ramifications on relationships and what the box looks like.

Sony is very much into this. I'll throw in some lingo that is not part of the acronyms of this business, PVRs and DVRs, the personal video recorders, digital video recorders, the things that go in a set top box. You might know them as TIVO, you might know them as Ultimate TV, the Microsoft product. You look at things like Xbox, we call that a "rug top box," the video game machines that have immense memory, have high speed broadband access, have contention for that screen in the living room -- that digital screen in the living room -- which is really part of this equation. Who is going to fulfill that? And clearly Microsoft -- Xbox Online, which you'll hear more about in January, is the kind of product that will build relationships with the broadband providers that Microsoft has been cultivating. And when you put the storage and memory at the set top you start to realize how much is going to be done in that area.

It leads to these issues of where the pricing model is going to go, how these technocrats who are building the business are directing this in new directions altogether. We think in terms of flat rate local phone pricing that we're all familiar with, but there's a lot of reasons to say bandwidth on demand pricing is really the way to go with this. We all know of prime time and off-hour pricing for airfares, bus fares, metro fares, as well as telephone calling. But I think these new issues are going to be addressed, they're going to be built on the relationships that the suppliers, including a new breed, beyond the Bells, beyond the six or seven remaining cable operators who are out there, have with their customers and how they bring that to this new range of content services, and application driven services that are really part of this new competition equation.

So I hope I've thrown a couple of ideas out for you. Now I'll turn it back to Rob.

ROBERT ATKINSON: Thanks, Gary.

I thought what we'd do is pick a few themes here, and maybe we can explore those first among the panel, and then open it up for questions. First of all, I thought this was very fascinating and enlightening and broad, all the way from where are we going in terms of content and media to competition in technology. But, one thing I think I want to start with is this issue of cost -- declining cost. From a national policy perspective, I think we want to think about that in a little bit different way.

Phil, you were sort of Dr. Gloom here, I think. This is a terrible thing. Maybe that's because you actually worked for these companies at one time and you think that declining revenues is a bad thing. I think declining revenues is probably a good thing, in the sense that it reflects declining costs, and declining costs is good for the country. Would we rather have a telecom industry that's using expensive technology or cheap technology? I think the answer is cheap. It raises productivity. Why is that inherently a problem, particularly if revenues are falling, but costs are falling, hopefully a little bit faster. So the industry shrinks in overall revenues, but its costs also shrink in a proportionate way. Why is that any worse than where we are today, if not better?

PHILIP C. RICHARDS: Only from the key point that I made, that survival is a problem. You have all of these traditional companies that are in the business, that have been depreciating assets. It used to be over 40 years, it's certainly gone down to 5 years, but still nowhere near fast enough so that they're true business cost base is anywhere near what it should be. Therefore, they face a key problem in terms of credibility to the investment community. So the problem simply is will we

have a telecommunications industry that is based on costs that are providing the service that are one-tenth of what they used to be? Can you make that transition without a real structural impact to the business? I don't think that's that easy. We have one fortunate characteristic that stands in the way of that, and that's users' lethargy. The average residential user doesn't know that there are alternatives that are vastly cheaper for providing service. The long distance companies very happily will provide you service at 25 cents a minute if you just call up and say, I want long distance service. If you don't answer telemarketing you'll never know that there's cheaper service available.

The same thing with the dislocation of services for the cable companies, the cable companies can provide voice services at much lower cost. What they don't have is the ability to manage that service as effectively as the RBOCs who have lived with it for years and years and years. So you're faced with the problem of how do you value not physical inventory, but the inherent knowledge of how to do business. That doesn't show up on the balance sheet. There's a problem in getting revenue for that ability.

It's something that is still shaking out, and how it's going to shake out I don't think we're able to predict.

JOE KRAEMER: Let me give a couple of thoughts, that come from the real world side. First of all, revenue in its basics is price times volume. So the concept that revenue goes down is probably not a good idea. What you'd like to see is price down, but an elasticity that drives volume up, and essentially revenue may go up, but your selling more at a lower unit price. That would be good, because if revenues just come down, that's a problem in some ways.

For one thing, you're deploying new technology in the context of old technology. So you really have a blended cost type structure, and you have to get a return, because if you don't get a return the people who are going to put up the money are not going to put up the money, so there will be no technology, and there will be a deteriorating blended network that cannot be replaced.

Another thing is that traditionally revenues falls in an environment of stability, and if you don't have stability, you don't have stability of technology, you don't have stability of demand. So I would posit the thought that the ideal would be revenue going up, because unit prices are dropping to the point where everybody is demanding it, and you're driving revenues up because of high volumes due to elasticity.

ROBERT ATKINSON: Let me just challenge that a little bit because I still say declining revenues can be a good thing. Let's say we look at a manufacturer and they use this old machine that costs them a dollar to produce a widget. Somebody comes in and invents a new machine. They haven't fully depreciated their old machine, but they can buy this new machine, and they can now sell at a cost of 50 cents per widget. And then they start selling widgets for 55 cents instead of \$1.05.

GARY ARLEN: Terrible margins in the widget business!

ROBERT ATKINSON: It's a tough business. Lots of competition in the widget business. And widgets are pricing elastic, it doesn't matter, demand is not going to go up. I guess on that regard, I don't care if demand goes up. It might be nice, but I don't see that as a public policy goal to push demand up. I see it rather as we want to see costs come down and let the market determine whether demand would go up.

So my question would be, why? Even given that, why wouldn't companies quickly adopt low cost technology, in telecom in this case. Secondly, are there issues about tax policy that get in the way of that? I know we're sort of veering off here, but I want to take this somewhere. Are there issues about tax policy where the depreciation lifetime doesn't match the reality? I know that's certainly true in some industries, like semiconductors.

JOE KRAEMER: I think the issue is, if you have lower cost technology, to the extent that it makes sense -- folks will deploy it. I mean they will deploy it in the concept of a replacement as a network depreciates, or to the extent that low cost technology provides new services for which there is a perceived demand they will deploy it. When you get into public policy issues, I think from a public policy point of view I would suggest you want demand to go up for things like broadband services, if you believe broadband is tied to the economy. So the demand side is important. You don't want the deployment of technology for its own sake, although there is sort of an economic effect of buying technology, but if nobody wants it, even if it's lower cost, it's a problem.

The issue on tax policy, you've got to tie that policy to the true economic life of what's being depreciated. Now, you may provide some incentives for R&D, or the commercialization of R&D, but to the extent tax policy requires depreciation that is not consistent with the true obsolescent life, then obviously we've got to get that straight. You can probably do some pump priming associated with some credits and things like that for deployment of technology. But all of that is artificial and arbitrary; unless you basically have a situation where somebody wants the services that are over the networks for which we're doing the stimulation, and that would drive demand up. That's the critical underlying issue. We've had lots of supply push. We don't need any more; we've got fiber

out the wazoo. What we really need to do is somehow get everything in synch so that demand comes up. I would suggest the events in Afghanistan may do more to the outcome than playing around with tax credits.

PHILIP C. RICHARDS: I completely agree that the demand is growing, and it's growing dramatically. The problem is, it's growing in the data side of the house, and as I said, the revenue for that growth, the revenue per bit, so to speak, is dramatically less than the traditional business of voice, maybe even one-tenth the revenue that you get for voice. Voice is still growing at about 5 percent a year and lower prices do not seem to, any more, do much to stimulate that. So, therefore, what you're doing is stimulating a much lower price service that's priced based on the cost of new technology. We're moving very rapidly into an era when the growth is moving onto a much lower price base. I think revenue is going to shrink, even though the demand is growing dramatically.

GARY ARLEN: Phil, I want to pick up on something that you put together in your opening remarks. We can't imagine what some of these services are going to look like some years from now, especially as Gen Y adopts these, and what they're willing to pay for it. How they'll use these services that are taking shape. Patty in her opening remarks referred to IMing. We haven't talked about that, but IM is a very low cost function of the networks that are there. It reflects how users, whatever we want to call them, who use these emphatically, 850 million IMs a day. If any of you have a Gen Y resident in your house today you know that there are up to 20 IM windows going at a time, while they're on the phone, while they're watching television, listening to a CD, maybe listening or watching a streaming video presentation or audio presentation, talking on a cell phone at the same time, there is so much going on. There's

a market taking shape that expects that from the networks.

So are you building a network that's capable of taking care of all those simultaneous services. Maybe on multiple delivery platforms, and is willing to pay for more of that, because right now these are incremental services at no additional charge, but building and figuring a way how to do that, added to that how these are distributed. We are talking about infrastructure, construction, and building. I look at it from the marketing standpoint. Very much fueled by a conversation I was witness to some years ago from an audience to the stage, where the chairman of Circuit City was a member of the panel. Retailers such as Circuit City get an ongoing revenue stream paid for by the carrier when someone buys that device in the store. Well, Circuit City wanted that from the cable modem, or the DSL providers. They sell it in the store, it's a retail -- it can be a retail product, it's sort of a surreal negotiation going on between the guy in the audience and the guy on stage, who represented the two parts of that equation. That's part of the business model of what's taking shape. How that retail relationship develops, who owns the customer, how it's sold, how the ongoing revenue stream works out, and how you bundle that, plus perhaps some content services into this new package that's taking shape, which will affect how this network is built.

ROBERT ATKINSON: Let me keep trying to be the skeptic here, because I'm probably the only person in this room that doesn't have cable TV, wireless, and broadband. It's amazing that I would publicly admit that. I do have four computers at home, though, whatever that's worth.

AUDIENCE MEMBER: What do they do? Are they networked? What have you got here?

ROBERT ATKINSON: I've got a computer that my son plays games on, one of each generation. I've got one I don't use, it's old, I've got another one that I use, but mostly just to take floppy disks back home from work, and put a new floppy in at work.

AUDIENCE MEMBER: Does the term Luddite apply here?

ROBERT ATKINSON: No, it does not. And the reason why is -- I'm usually the only person in Washington who has this opinion -- if I were to ask people what your median income in this room is, I would suggest it's probably twice as high as the median income in America. So I don't want to be too provocative here, but I think there is a reason why most people don't have broadband today, and it's because they don't want to pay for it.

GARY ARLEN: Or it's not available in their neighborhood.

ROBERT ATKINSON: No, actually, broadband is available in 50 percent, 45 percent, 50 percent, you can get DSL. I think it is in the newest study. So it is available.

AUDIENCE MEMBER: How about they don't have it because they have to plug it into their computer, as opposed to some sort of natural life function. The idea that we're still -- the computer is the device and we're putting broadband in. I think it's a good example, if you don't have a computer you don't have the need for broadband.

ROBERT ATKINSON: Say it again, Sam.

AUDIENCE MEMBER: Broadband requires a computer. The problem is that in order to want broadband you have to have a computer, and you have to be a fairly sophisticated computer

user. The problem in my view is until the day that broadband delivers capabilities to the home that people use in their every day life, that we're still talking about -- when I wrote a book called Phone Writing. As Gary will remember, its that people don't have a use for this stuff. A computer is a machine lathe, it's a machine that you use to write things, and I think we need to think -- Gary obviously doesn't agree with me.

GARY ARLEN: I don't agree with you. I agree in this transition period, that's where we're living right now. But as of some time in January, when the Xbox and the Game Cube, as those rug top boxes are called -- those boxes won't be in 40 million homes, but the video game console is in 40 or 50 million homes, and it is something that you really don't use for writing term papers, or doing your taxes on. It's a different kind of device, it's an entertainment device, and it is a broadband connection. I think we're living through the transition stage right now, and by the way some of us do other things on the computer, including video games.

PHILIP C. RICHARDS: A couple of things to mention as we go through this. First off, I just got a press release yesterday that the cable TV industry says they can provide cable modems to 70 million households at this point, which is about 65 percent of the country. The cable industry has done it right, and the RBOCs have not done it right. They've gone after the audience that they could serve, and now they're expanding into the business audience as much as they can.

And the real problem is that they have found their niche at typically 40 bucks a month is a real price that people are willing to pay, it's not too expensive, and they get all these services, including services like this, narrow casting, which I believe is going to be a major impact on the usage of the network in the near future. I'm involved in several organizations, and they can

narrow cast their conventions, they can narrow cast various activities using the existing facilities at no additional cost. You've got to have a computer to do that. But then what is it? Sixty-five percent of the households have a computer now, so that's not the issue. The issue is to build up the demand for broadband.

GARY ARLEN: But just to set the issue straight, Phil, the way you get that \$40 and maybe \$50 a month cable modem service is you already are buying the \$30 or \$40 or \$50 a month cable video service. Hopefully in the bundle they're also going to sell you three or four video on demand or pay per view movies a month. So all of a sudden you're a \$100 a month value customer to the cable operator.

PHILIP C. RICHARDS: That could be, although you can buy cable modem service at about \$45 a month, without buying cable TV service. My son has that right now, he has just the cable modem.

AUDIENCE MEMBER: John Wohlstetter with the Discovery Institute.

Part of the problem, as George Gilder and I stated in a white paper called *Broadband or Bust* that Discovery released last month, part of the problem is that broadband isn't really broadband. What you're getting, first of all, you're not getting anywhere near the advertised speed, you're typically getting about 500 K, and that's just as true of DSL as it is of cable modems. All you get is slightly faster web downloads. Charging \$40 or \$50 a month just to get a web page a few seconds faster may appeal to the 10 percent of the population that has it now. But real broadband, you need to get 10-plus megabits feeds or the consumer. The American Consumer Association at the Progress in Freedom Summit in August asked for 100 megabits per home -- 100 megabits per second capacity to the home. You can get things if you get at least a 10 to 20 megabit

connection, and for that you need VDSL-type connections. You have to get fiber within about a half mile of the home if you're going to get the kind of bandwidth you need for, let's say, a digital HDTV channel.

For example, of Starz-Encore is saying that subscription video on demand will be a model that will work. So you're not going to get these with what passes for a broadband connection, let alone the FCC's definition of 200 kilobits. You don't really have broadband now. You have fractional broadband now, and until you get real broadband you're not going to be able to provide the kind of content that is compelling enough to get people to pay anywhere near \$40 or \$50 dollars a month.

ROBERT ATKINSON: I don't want to pay a lot for faster downloads, that's why I don't have broadband.

GARY ARLEN: What you're saying is the re-invention. I think we all have this idea, but how do you plan for what this business will be in four or five years from now? I can't wait until someone nails any of these providers saying. I'm paying \$50 bucks, you're promising me 200 kilobits per second, 500 kilobits per second, 1.5 megabits per second. A friend of mine in Chevy Chase on the Comcast Cable is tracking throughput of 30 kilobits per second on his cable modem, half of dial up speed. He's not a happy \$50 a month customer of this service. I mean that's the kind of issues that are -- cable has its own customer service problems, let's leave it at that. But there's going to be a lot more if they're delivering that kind of throughput.

ROBERT ATKINSON: Let me throw out a consistent contrarian view, or just throw it out, I'd really like to stimulate a response to this. Why couldn't we assume that actually everything is just fine right now? That what we had was this big investment bubble in telecom,

and that the lack of investment or the decline in investment is actually nothing problematic. Joe, your slide at the beginning showed we're in that little hump, that's a market response, that there's really not very much demand right now for 10 megabits. People don't really seem to know why they would want to pay for 10 megabits, so why would companies want to go and deploy 10 megabits, and that things are just going to move along. Incrementally the technology gets a little better, consumers get a little more sophisticated, applications get a little more robust, and eventually we will get there. Is there something wrong with that vision, or is there something more problematic that we need to address?

PHILIP C. RICHARDS: Let me steal Joe's idea of a virtuous circle. That's an interesting concept. It's driven the PC business for the last 20 years, and continues to drive it. I anticipate, and it certainly has driven the online communications data rates, you know, when we started using the Internet we were at 9.6 kilobits per second. We went through all the capabilities we could get out of modems, and that's where a lot of people are today. But the dial up connections are going to go away. As the demand builds for narrow casting and other video conferencing services and so forth, the demand for higher speed service than even what you get today will certainly be there. Presently my cable modem service is delivering well over a megabit both directions, I upload files, pictures, all the time.

So it's going to be, as the usage of broadband builds up, no matter what it is today, the creative people are going to find ways to use it, and attract more people, and then the leading edge people will demand even faster broadband, and the creative people will find ways to take advantage of it. I have great confidence that five years from now, I haven't a clue as what the most important service will be, because the creative juices are still working out

there, despite all the negatives that exist. They'll come up with something that is going to use those services as they become available.

JOE KRAEMER: Rob, what you describe with respect to large business customers, almost none of this discussion is applicable. At the large business level if you want 10 megabits, 100 megabits and it makes sense, either because you increase revenues or you decrease costs, you do it. We're really talking about essentially consumers and small businesses. We ought to bound that so we don't have folks thinking that American business doesn't have the bandwidth it needs. It can get what it wants to pay for, and it pays for what either drives revenue or cost.

We're in the consumer markets; so we're really talking about the pattern associated with consumer take on a mass-market type product or service. What you describe is basically very consistent with the S curve. You start with your early market, which is some combination of early adopters and technophiles. It moves into a mass market, and that's a critical hump, and that has an S-shaped curve. Then you move into a late market, and then you've got your 75, 80, 90 percent penetration. So in that sense, we're moving in that direction. So you could argue, and there is a view expressed in the Delphi study we're doing. That makes sense, and it's not a problem. It is along the normal curve of the S. If that's true, that's fine.

Now, there are some issues that you might want to look at going back to your public policy. Are there any public policies that are inhibiting -- let's not move to the facilitation side, with tax credits, let's say is there anything that might be inhibiting. Then you may get some discussions. For example, the all time bandwidth enabler is essentially to drive fiber into neighborhoods, and then fiber to the curb, fiber to the home, we're all talking now 2010, 2015, et cetera. Is there anything that inhibits

that? The RBOCs would argue that because they're going to have to make the investment. If you want a Project Pronto with SBC, you've got some risk, but we don't want to have competitors ride at essentially no risk, no cost, on our network, or we want to be able to charge the prices to them that we feel is appropriate for resale. Now, some people would say the RBOC argument has merit, some say it doesn't. But that is clearly one that is standing as a potential inhibitor right now.

From a public policy point of view, somebody needs to at least look at that, and either dismiss it or basically move to look at it and whether public policy ought to do something about it. Then there may be some others. Digital television, we talk about the pipe, but over the air digital television will deliver 17 megabits, assuming we get digital television up and running, which is lost in a whole series of issues about must carry, et cetera. There are some public policy issues that can enter here. Don't forget we're talking about the computer, the television as a display device has gone digital. That animal is going to have memory, it's going to have storage, it's going to have connectivity. There are going to be display devices all over the house. The house is going to be wired.

That gets to the point that many people are talking about the home networks. So let's talk about really what happens in the home. There are a number of things here that are all coming. I would suggest that what you're describing on the mass market is consistent. From a public policy point of view, if folks here are interested in policy they ought to ask, are there any inhibitors on this, yes or no? If yes, maybe we ought to fix that. Otherwise we could step back.

Other folks would argue that this is very critical to the economy. From a policy point of view we ought to move this forward, accelerate the

curve. That goes back to the comment made about tax policy, tax credits, et cetera. So all this is up for debate. Basically the S-curve, mass market adoption you describe is what we've always used for television, Internet, et cetera.

GARY ARLEN: You've already got the precedent for that, too, in the enterprise sector. I'll go back to something I alluded to earlier -- bandwidth on demand. You've got the infrastructure built; enterprise can use it when they need it. One model might be the VSAT, the small aperture satellite we used in business networks as long ago as 20 years ago. I think one of the issues of this is how you work this into an infrastructure which doesn't have cross subsidies anymore. So business and consumer pricing are completely separate. Multi-tier offerings are going to be very complicated for all users, both business and residential users to adopt. To build a network that can handle that is really one of the challenges facing the industry right now.

ROBERT ATKINSON: I want to move into some of the competition questions and then let people discuss it. I wanted to just finish this broadband piece by asking each of our three panelists to think about broadband as a supply issue. I do believe that it is in the public interest to accelerate the deployment of broadband. If it were simply something where the benefits were captured by the individual user, which is like TV. I don't think there's any public benefits from digital TV, maybe you do, I don't -- but I think there are vast implications for broadband. I do think there are vast external benefits for broadband. I think there's a public policy role to deploy it faster.

I'd ask each of the three of you to say what are the two things that you would recommend that Congress or the administration, or FCC, or other regulatory agencies do in those areas. What are the top two things on your list, if you

wanted to speed deployment of broadband in the next five years?

GARY ARLEN: First of all, I just want to be contrarian, take your role, to not believing in digital television. DTV is happening, it's happening in a very weird way. It built an infrastructure for a whole other series of interactive and other services that I think are part of this equation. You just want to know what Congress and the FCC and the administration should do, right? And we can't say, get a new FCC, get a new administration, get a new Congress. That's not one of our options. There is a reason for industrial policy on this one. Broadband does serve a national objective and should be implemented.

ROBERT ATKINSON: Let me make the question easier. It doesn't have to be the most important, or your top two, just two interesting ones, how about that.

GARY ARLEN: But the interesting ones are the ones that government shouldn't be involved with. One of the barriers to broadband is, what's it good for. It's not just good for downloading e-mail faster, downloading what we have on the web today. The new Internet with all it can provide, in video on demand, in education, distance learning, home working, teleworking, suggests that content is a big driver, but obviously content becomes a First Amendment issue right away. Government shouldn't be involved in any of that, content promotion, or content restrictions. One of the issues is how to drive services without touching the First Amendment aspects of content.

The other part of it is goes to an issue that we've bounced around for a long time, and that is "information stamps." Is information policy so important that we will subsidize it as we do food stamps to encourage the deployment of it, so folks who don't have access to it, this is the 40 percent who don't have computers, the 30

percent who don't have access to multi-channel service right now, are enabled to get it if they want it? Now, the market has voted, and some people say, I don't want any of these broadband services. Some people say, I don't want cable TV in my household. The fact is, should there be a way to subsidize it through some kind of, what we'll call for lack of a better term, an information stamp, or a communications stamp, to allow folks who can't afford it, but want it, to have access to it. So those are two broad issues.

JOE KRAEMER: Let me point out a couple of thoughts, since you want it to be interesting. One may be for the homeowner or the renter, to allow the homeowner or the renter tax credits, deductions associated with purchasing and implementing broadband capability. For example, maybe the broadband loop is part of the house, not the cable company. In other words, it's from the point on the street where you do the interconnect coming in, like a water pipe. We allow people to finance the thing as part of the house, or deploy it and get a credit in the year in which they buy and own it, including broadband in the home. We're doing the credit kind of thing, not at the big business level, but we're really doing it. Not for big business, which gets into all kinds of issues, but we're dealing with home owners, and maybe it's capped by income. For example, if my income is \$32,000 a year, I get a large credit, if it's \$250,000 I get a kiss on the cheek kind of credit, et cetera. So we can play with it a little bit.

Another thing we need to do is deal with copyright. The kind of content that we want to pull -- that really has a demand-pull is copyrighted. We've got to get in there with some kind of policy that enables people to pull it in. This goes to the issues associated with the ability to duplicate information in digital form. I mean, if you pull down -- pick a movie.

AUDIENCE MEMBER: *Harry Potter*.

JOE KRAEMER: The issue is if you duplicate this and you can resell it and all that, and we need some kind of policy that says, hey look, we're going to have certain standards that render the ability to replicate information in digital form, and basically sell it, et cetera. We've still got to have a fair use kind of concept in here.

Another thing the government can do is, the government recently has gotten out of the standards business. There's always a risk when the lumbering elephant of government goes into the standards zone, but there may be some standards, and that goes back to the copyright. Where the government just plain says, hey, this is the way it is, do it. Let's quit messing around, and let's just do it. So that could be some area.

Another one that's controversial is this whole issue on the phone lines, is TELRIC ("Total Element Long-Run Incremental Cost"). A forward pricing concept that says, you Mr. Phone Company, deploy your technology at whatever cost it is -- but you're going to have to resell it based on the regulator's calculation of forward pricing based on best available technology in the year 2010. Some folks might argue that really is dumber than a brick and ought to be changed. We also have this issue on the RBOCs, the whole question of whether or not if they deploy fiber they have to share it at TELRIC. Those are the kinds of things where you really get into public policy, and are very interesting kinds of issue areas.

PHILIP C. RICHARDS: I can't say that I see much success in the regulatory process that we've been going through for the past few years. A substantial portion of it was aimed at, in the telecom area, protecting the CLECs. The one thing they couldn't do from a regulatory standpoint is protect them from the investor's

unwillingness to support them. So that's a dismal failure. To my mind, the competitive environment that is going to emerge is the cable versus telco. The key problem is that while the RBOCs have a very, very substantial investment base to work from, they are not allowed to use that to destroy the cable companies when they finally recognize that they're the real competitors. I think that -- let me be honest, I'm a guy who thinks divestiture is a bad idea. I think the country lost because we split up the phone business. Everybody says, look at all what we've accomplished since then. I'm the kind of guy who says, it would have been accomplished anyway. We had a good business. We broke it apart, and it's been suffering ever since. So what we need to do is make sure the financial muscle that is out there is not used to destroy any more competitors than it has to. To me, the biggest issue where the national enforcement authorities can play.

QUESTION: I'm a little surprised on the discussion on competition. I do agree the cable companies are going to be, and already are formidable competitors, especially with the new DOCSIS (cable) standards that are coming out that will integrate IP telephony into their boxes. They're clearly going to bundle that, so it's going to be competition. I think Microsoft and AOL, because of resources they have, number one, and the marketing capability they have, number two. This ties into instant messaging, e-mail, etc. You touched on it, but it really hasn't been a factor in the discussion too much. I would say that's particularly true when you look at broadband deployment, which is one of the platforms they need to make these kind of communications technologies work. If you have the computer on all day, which nobody has talked about that much, that's really a key factor in broadband. If you leave your PC on it's a communications device, and that's what people are doing with it. So AOL, Microsoft, companies that do content and communications that way on the Internet are a factor that I don't

think has been really discussed, and I think are a major factor in competition. So you have said the industry is going to be more competitive over time, despite what's happened with telecom policy. I think that's true, but I think these are parts that haven't been talked about much.

GARY ARLEN: You've hit it exactly right. I mean, as marketers know, they sell broadband for high speed, even though they don't always deliver it at high speed. The thing consumers like about the high-speed services is the "always on" factor. It's there; it's like dial tone. It's just part of life. The way it's used, the applications, which really drive what I'm looking at, we think of IM as the cute things that Gen Y is doing, but increasingly in an office, in virtual work groups, folks who are on the same project on different floors of a building, in different buildings, in different campuses are using IM the same way they use water cooler conversation, in a conventional business. That's often hard for some companies to understand how important that is to say, are you going to the meeting at 10:30, click on an IM, or who has the relationship with a client. Those are new ways of doing business, and it is really part of the broadband environment. I think you've hit it exactly right, and that is market issues, not regulatory or policy issues.

ROBERT ATKINSON: Well, let me just add, you got me exactly to where I wanted to go next, which was this question of substitution. Let me ask the panelists about that. I think it's the new version of XP, if not it was something they came and showed me a few months ago, but you know they have the Microsoft ads of the teenage girl talking on the phone, and she's not allowed to talk on the phone, so she's talking on the computer to her best friend after her mother banned her from the phone. Eventually that will become very easy to do, sort of IM and instead of IM its IV, instant voice. What are the implications?

JOE KRAEMER: The V should be video, not voice.

ROBERT ATKINSON: Video telephony really. And eventually it will be there, but certainly in the short-term for now it looks like certainly IV will be here. If you're using IV you might not want to use other phone systems. What are the implications of that? Is that something that's going to affect long distance more, how do you see that playing a role in competition and in revenue?

JOE KRAEMER: Rob, I think this is relevant. Can I go back to the audience on his question? Let me ask you a question here, AOL and Microsoft in some ways, and of course we haven't talked about the value chain and where you apply it. The issue would be this. If I'm AOL and Microsoft, I'm essentially packaging content and stimulating demand. I stimulate demand for content that requires more and more bandwidth. You're the bandwidth supplier, are they competitors or allies? Because as they stimulate demand for this service -- and we've got VOIP, so if you want to be the voice provider or, and you think of your future as supplying voice, then they're a competitor, because they stimulate. But in terms of this content with video and high speed graphics, work at home, aren't they basically organizing, stimulating a market from which you benefit because you'll be able to drive bigger and bigger pipes, more fiber into the neighborhood, fiber to the home, et cetera. And isn't that good?

AUDIENCE MEMBER: They're both. It is good in one sense because it does stimulate demand. But if you look at traditional telephone companies, and I'm saying a company like five or ten years ago, a traditional telco.

JOE KRAEMER: Like one of those other RBOCs.

AUDIENCE MEMBER: We're not Qwest, we've actually changed a lot. Five or ten years ago the revenue streams were really there for a telephone company, lines, selling lines to people, access which is usage based, and vertical services and other services like Yellow Pages. Every one of those services today is suffering some competition, and it's real. We have line loss, for example. We sold fewer lines last quarter than we did the previous quarter. That's unprecedented, the drop off in lines. Now, some of that is economy. I think a lot of it is broadband substitution and wire substitution. People are going home with 2500 minutes a weekend and making phone calls, long distance calls and other calls instead of using the land line phone, and they don't buy second lines any more. That was a major revenue stream for the company, so it is competition.

Secondly, when they put broadband in, and we're selling that, too, but cable is obviously as well -- very aggressively -- we don't get all that business, 70 percent of it goes to cable. So again, we're essentially losing a line. When people put a cable modem in, they usually say, I don't need a second line anymore, so they, again, lose a line there.

If you look at minutes of use, they are staying online longer. The total things they're doing, instant messaging, e-mail, wireless, is actually expanding. The diversity of communications today is phenomenal. They're not just using a land line phone; they're using other things. If they're using other things, they're using a land line phone less. Broadband is not measured in minutes. When they get online, they could stay on forever, as Gary said, and they do stay on forever. So the minutes of use, actual making phone calls is going down. So it's both. I want to stimulate demand, but right now it is real competition.

JOE KRAEMER: You have a big chunk of a wireless company, so you do, in other words, when these folks turn off to mobile, and young people do, I call them on the mobile phone even if they're at home. God knows whether they ever pick up the other because it's connected to an answering machine, which is in your central office, so you get the revenue.

While Bell Atlantic has the wireless phone, you do supply broadband, you could argue DSL is not the world's greatest technology, in some ways you're retrofitting a voice network, and the technology is very good to let you do that, but it is a voice. The bottom line on this is that there is potential there on the networks. Why don't you just drive fiber into the neighborhood?

AUDIENCE MEMBER: Regulation.

JOE KRAEMER: Isn't this important, because RBOCs are a very, very critical component of this. Broadband most likely will be wired to the home, and there's only two wires. The electric company can play with the thought of doing something down there, but there are only two. It is true the RBOCs are very critical, because they're going to default the market to the cable guys. In other words, you said the cable guys get two-thirds of the market, well, I mean, what are you going to do, flop on your back with your feet in the air and say, they can have two-thirds, I get one-third, or do something about it?

PHILIP C. RICHARDS: They increased prices.

JOE KRAEMER: No, no, that's not true, because Bell Atlantic is running this special, free installation, drop it down, it's beginning to look like the early years of cellular. I'm sorry, I didn't mean to just go off on this, but RBOCs are critical, and we had a real, live rep here.

ROBERT ATKINSON: Other questions or comments?

AUDIENCE MEMBER: I'm wondering if everyone else on the panel could comment on Mr. Kraemer's projection of 2003 summer being the beginning of the recovery of the telecom industry.

PHILIP C. RICHARDS: First of all, I don't think the industry from a demand standpoint has been that hard hit, and I believe the recovery is probably already starting. So, I don't think it's going to take anywhere near as long. I'm sorry, Joe, I just don't agree with you. I think that it's just like all the investments, look back at the gloom and doom that was being predicted for the stock market back in August and in September, and the recovery is on the way. I think that by probably the middle of next year, we'll be saying, what problem did we have? We're on our way out of it.

GARY ARLEN: I'm also a little more optimistic than that, but everything I see says fourth quarter next year is the earliest we'll see it, partly because these pieces -- there are so many wild cards in this game right now, and any one of them could topple the whole process. So 2003 is a little late -- late 2003 is a little conservative for my view, but I don't see anything much earlier than this time next year. That's barring any other catastrophes or surprises.

JOE KRAEMER: First of all, Gary had said late 2003. I said summer '03. You had the big picture. I'm a CPA; I go for numbers. I don't think you've actually seen the revenue decline yet. In other words, if you took a look at the numbers I just put up and said that in Q3 this year, '01, we had the revenue decline and it wiped out the revenue gains for Q1 and Q2, it's just hitting. You had businesses now that are going to close sites, which means you disconnect your big pipes. Your minutes of use are going down because you've got fewer employees. There are going to be fewer

people there. This economy has not yet gone through shrunk state yet. We've got the personnel reductions; we're going to have site closings. Of course, you have the natural effect of the Internet where folks are doing things themselves and cutting out a middleman. When I want to do an online booking, I do it myself, I don't need a travel agent, there goes the site. There's just a whole series of things that are coming down in combination -- technology, compression, the economy. So revenues within the industry, but the economy - - and if Phil is right that the economy was going to pick up, then I think you lag telecom off the economy two quarters, three quarters. But if Phil's wrong, and this economy doesn't begin to recover until '03, then you're going to lag telecom off the recovery of the economy. It's lagging, not leading.

PHILIP C. RICHARDS: I agree.

AUDIENCE MEMBER: I have one question; the ultimate bandwidth leading killer application will be video. Can you go into that just a little bit more, it sort of seems like high speed, bandwidth eating kind of negates that? You can download pretty quickly, how is this going to eat up bandwidth?

JOE KRAEMER: You have to establish what bandwidth we do have, and when you start talking effective bandwidth of 30 kilobits and you're supposed to be getting 6 megabits, you don't actually have what's advertised. What will truly establish these demand pull through will be video of all types. It will be video telephony in the end, which really has a high take rate, at least theoretically, among folks under the age of 30. You will also see movies on demand. Don't forget you'll be able to display them on your TV set, not your computer, because you're going to have a digital television, and you'll also have home networking will be there, even if it's primitive. You're going to have education at home. You've got this issue that was raised

that, you know, a government official sends in an email and says, by the way, you guys haven't considered our plans to quarantine American cities and neighborhoods in the event of bio-terrorism. So folks won't be moving around. You've got to be able to do things at home with reasonably high speed.

It's video, too -- video is the one thing that justifies being online all day, and when we talk you know voice mails and we talk e-mails, video mails. When you begin to have the little split screen, when we do voice over Internet protocol, but it's not just voice, the thing is voice and video over Internet protocol. That's when you really get to the point where you're demanding bandwidth and that's probably going to justify the revenue stream. It's going to put fiber into the neighborhoods.

GARY ARLEN: Joe, the people are rushing home right now to watch the broadcast of this. We'll all go home and log on to see this program in the archives.

JOE KRAEMER: Yes, there's no doubt, this is all part of the demand pool that we're creating. I think in terms of what it is, and maybe bandwidth eating, but we need bandwidth stimulation. We're not eating what's there now to the home and we need to get a demand pull -- that will be video-type applications. That's the only thing -- because, if all we're going to do is check email, God forbid, all you need is dial-up. If it's just plain, old-fashioned text e-mails. If you've got the baby picture attached, yes, you can download one little JPEG. When you want to see video of your grandson's birthday party, you don't want to spend three hours downloading the thing, that really makes a difference. Those are the kind of applications that will create true demand pull, which will create the demand pull for the bandwidth.

GARY ARLEN: MTV, Nickelodeon, BMW Films.com, are just the beginning of what kind

of content, let alone education, just chews that up, and it is video.

AUDIENCE MEMBER: Another application, Peter Huber at the Gilder Forbes Telecom Conference the other week thinks the killer app is going to be security. You're going to need, for example, to scan all these trucks and cars on the road and do it in real time and connect it to remote databases. You'll need to do profiling analysis and provide security in real time over a few years. And millimeter wave of technology that can do this has just become economical in the last year or two through companies like TRW. For this kind of thing, although it may be restricted to the home, you're going to have a large number of governmental networks and business networks. You're going to need three to six orders of magnitude more bandwidth and processing power and storage power than people were looking at even a year or two ago, just to kind of do these things in real time.

JOE KRAEMER: The critical factor is, of course, the extent to which it's being pulled by government and industry. That pull will create an environment where the components -- the network components and technology -- are deployed such that unit cost and the like will come way down for deployment to consumer and small business. They can ride the piggyback of the demand out of government and big business.

AUDIENCE MEMBER: You'll be talking enormously high data rates, terabit speeds in the networks to do this kind of stuff in real time and processing power that will use 1000 PCs running Pentium 4s to do this stuff in real or near real time.

PHILIP C. RICHARDS: I would like to make one comment that I'm sure I'm a voice in the wilderness. There's a lot of presumption in a lot of the talk about the displacement of the voice network that assumes that voice over IP is the

solution. One of the problems I have is inherent in that use of the regular Internet for the random voice over IP call. Now, if you have a dedicated network, or a corporate network and so forth, you can fine tune it so that it works fine. If you use the regular Internet, however, the round trip latency is going to be as bad or worse than a satellite voice connection.

In the middle '80s, those of us that were in the industry know what happened to that. It was in 1980-1981, the big savior for the industry was going to be satellite long distance, until somebody discovered that you couldn't hold a valid business conversation using it and it died. I believe that there is a segment of application for this voice over IP where people really don't have an alternative at a reasonable cost. To me the primary value of voice over IP is that it will drive the price of regular voice service down to where it should be based on the cost of providing the service.

JOE KRAEMER: Since we're wrapping up here, one issue we've danced around is what business are folks in, in terms of a value chain. We had Bell Atlantic, and we had the wireless industry, the issue is, are they carriers, and they basically make money from the concept that I make it from carriage, whether it's basically fixed use or usage based or combination thereof, or do I essentially in some way participate in the content type environment? Do I own the customer or does somebody else own the customer? All these are issues. The reason they're critical is because when a carrier faces up to deployment of an entirely new network technology or network overlay, 3G, 2 1/2G, fiber to the neighborhood, they really have to understand where the margin is going to come from. What happens with carriers is, at the deployment of a new technology, their pricing is relatively high, and it gets driven down quickly, public policy contributes to that because they tend to be regulated as well as the market.

The effect is, they have to understand whether they can recover the cost of the network, or they won't invest in it to begin with, and that's an issue. Further on down, they realize that as their prices come down, everybody is making a lot of money, higher margins on content, than they are on carriage. That's a very critical strategic issue as to whether you partner, or whether AOL buys a wireless carrier, or who does what. Those are, however, strategic issues affecting investment decisions that are not necessarily subject and the public policy can play a part, because you have to basically do resale at regulated, dictated prices, you may not invest, or you may invest a lot slower. There is also the issue here of what business are carriers in or should be in, want to be in, can be in.

PHILIP C. RICHARDS: Joe mentioned it, and I think that's a very real conundrum that we're faced with. The Internet was created sort of as building on a cost based service for voice and for other activities, it used universally labs to do it, and nobody charged anything for anything other than connectivity. As a small piece of the total, that wasn't a problem, but as it becomes the overwhelming piece of the total communications infrastructure, the whole method of deriving revenue has got to be a question. Because I don't believe that the pricing structure that exists is a compensatory pricing structure, and exactly if the content people are the way to get that pricing structure in place, then that's going to be a very real impact on the total industry.

ROBERT ATKINSON: I feel like we could keep going, or at least I could keep going with a lot more questions for our remaining panelists here. I will, however, take moment to sum up in one minute.

What strikes me about the discussion this morning is that sort of the more things change, the more they stay the same. I think we all

thought that the '96 to 2000 period was this period of immense turbulence and change. It strikes me that the next four or five years will be similar to that with the rollout of new technologies. Certainly the possibilities of consolidation, the possibilities of competition and substitution are there. The telecom industry is, if nothing else, an industry that is not inherently stable compared to many industries. That is, frankly what makes it so difficult to figure out what to do. There are so many different forces and different possible paths that this all take. We got a very good sense of that this morning of what some of those might be.

In closing, I want to thank Phil, Gary, and Joe for being here, and also I want to thank Patty Figliola and Sam Simon of New Millennium Research Council for hosting this forum. I think it was very useful in an attempt to really bring people together and have good conversations about these pressing issues.

Thank you all for your attention, and hopefully see you at the next one.

Appendix A
Joe Kraemer's PowerPoint Presentation

Version 3.1

**SUMMARY OF STRATEGIC
TRENDS IN THE U.S.
TELECOMMUNICATIONS
INDUSTRY**

October 31, 2001

Compiled and Edited by:

Dr. Joseph Kraemer

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SUMMARY OF STRATEGIC TRENDS: INTRODUCTION

This document, *Summary of Strategic Trends in the U.S. Telecommunications Industry*, remains a work-in-progress. Over 50 senior industry executives and providers of professional services (e.g., bankers, attorneys, consultants) have contributed to the current version (3.1). Comments and criticisms are still being solicited and compiled.

The objective is to provide a non-proprietary vehicle for knowledgeable industry participants to share perspectives on what has occurred, is occurring, and, most importantly, can be expected to occur in the telecommunications industry. Opinions are not attributable to individuals and represent personal views not “official” corporate positions.

The method employed is a modified Delphi in which industry experts react to a hypothetical “future” with a mix of agreement, criticism, and alternative explanations and interpretations. Given that the participating experts have decision authority in their organizations, it is probable that they will act in accordance with their perceptions/beliefs, thereby creating the classic “self-fulfilling prophecy.” Therefore, whether you as an individual agree or disagree with the consensus, you can expect that the strategic and tactical plans of industry stakeholders will reflect the consensus view of *strategic trends* or a close variation thereof.

SUMMARY OF STRATEGIC TRENDS: INTRODUCTION (Continued)

The *Summary* began as a late August email brainstorming session among three consulting firms. Clients were then asked to comment, and more-and-more input has occurred as versions of the document have been forwarded throughout the industry and around the country.

Some of the readers of this document may wonder why their comments have not been included or noted in some way. This occurs because the compilation process focuses on consensus positions and only includes minority views that have considerable support (e.g., Item #4, the extent to which RBOCs will compete with each other). A key value of the Delphi technique is its concentration on the identification of convictions/opinions held by decisionmakers that are likely to affect the future strategies of their organizations.

Decisionmakers have begun to react to the events of September 11 and its aftermath. Several issue areas in this version reflect post-September 11 abandonment/modification/reinforcement of previously-held views.

If you would like to participate in the process and have your perspective incorporated in the next version, please forward to me your comments, insights, and disagreements.

SUMMARY OF STRATEGIC TRENDS: INTRODUCTION (Continued)

Those who submit comments will then be included on distribution for subsequent versions of the document. My role is similar to that of a moderator in an online chat room (i.e., compiler, reporter, and, occasionally, interpreter).

Regards,

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SUMMARY OF STRATEGIC TRENDS: TOPIC INDEX

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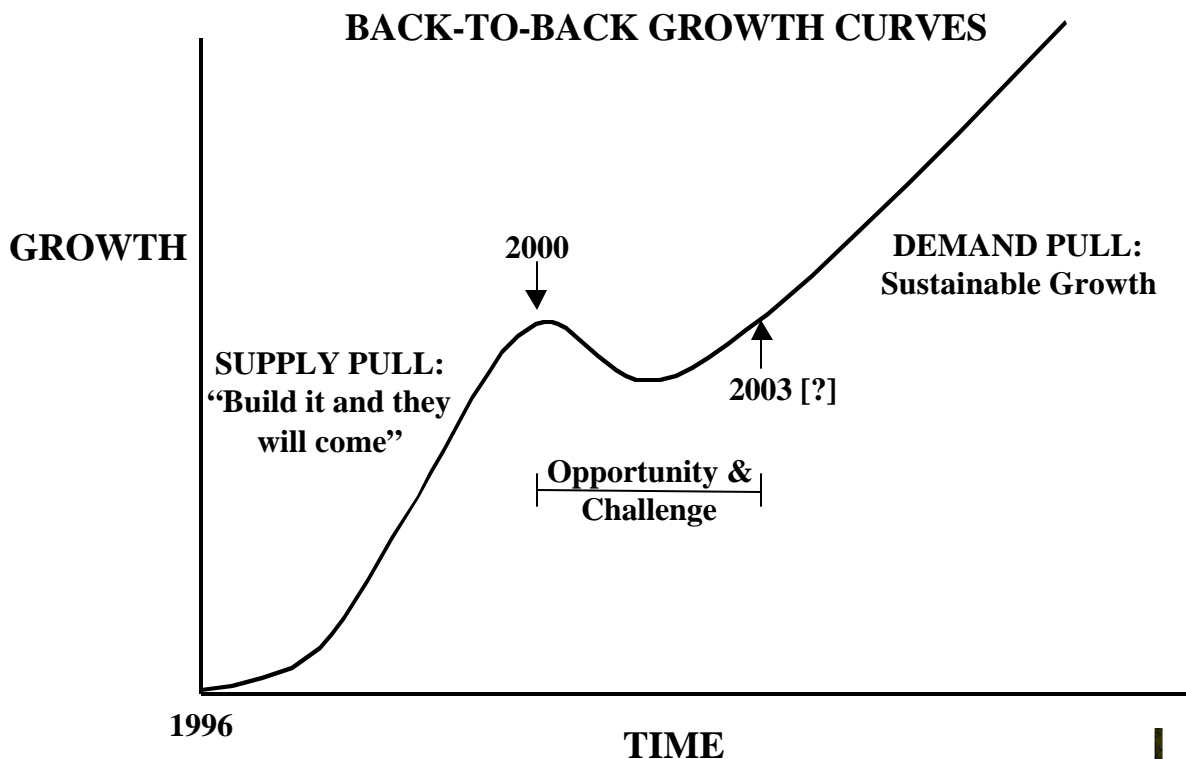
SUMMARY OF STRATEGIC TRENDS

- 1. In the *best case* scenario there will be no material recovery in the telecommunications industry until at least the Summer of 2003.**
 - The period from now until the recovery will be one of “triage” during which dead and dying businesses will be identified and closed out so as to maximize the remaining opportunities for the survivors. The triage process began in late 2000 and will continue at least through 2002.**
 - Aggressive and well-managed companies will recover sooner and take advantage of the industry situation to improve their competitive position.**
 - Recovery will be determined by general economic and, increasingly, political factors not under the control of the telecommunications industry.**

SUMMARY OF STRATEGIC TRENDS

2. “Supply Push” dominated the 1996-2000 period when aggregate network capacity came online far in excess of near-term demand.

- The next growth period (2003 [?] and beyond) will be characterized increasingly by “Demand Pull” as: (1) customers sort out the applications they require and the amounts they will pay; and (2) younger and more “wired” generations (born 1970 and after) start households and increase their discretionary income.
- The management challenge is to take maximum advantage of the opportunities present as the industry consolidates and retrenches.



SUMMARY OF STRATEGIC TRENDS

- 3. The carrier segment of the telecommunications industry is consolidating with an eventual (circa 2004-05) configuration similar to the airline industry - - three or four majors, a few regionals, and some niche players.**
- The distinction between “local” and “long distance” will disappear. Telephone service (including local and long distance) will be delivered by vertically integrated suppliers.**
 - The September 11 attack reinforces the need for robust, interconnected networks that have a high probability of survival in the event of natural or man-made disaster. That argues for a consolidated base of carriers operating with agreed-upon disaster protocols.**
 - Major deals will be stock deals. Low or falling stock prices mean no or fewer deals which will delay consolidation which, in turn, will delay recovery.**
 - Consolidation will not be easy, particularly for smaller carriers. If one carrier acquires another, then the result is more customers on separate networks that may not be technically capable of integration at the physical and logical layers. This works against achieving economies of scale.**
 - In most cases, the post-transaction period continues for 12 to 24 months. During that time, the risk is that the acquirer’s management loses market focus and becomes distracted by organizational design and personnel issues.**
 - Given their lack of cashflow, financially stressed carriers will have a debt load that is a burden. Therefore, acquisition of such a carrier (on an asset value basis) may be financially viable only after the carrier files for bankruptcy.**

SUMMARY OF STRATEGIC TRENDS

- 4. Of all the participants across all of the segments in the industry, the RBOCs are the most likely to survive and thrive.**
- **The RBOCs will dominate North America and most likely absorb *at least* the traditional long distance businesses of AT&T, WorldCom, and Sprint, all three of which are “failing companies.” The local infrastructure developed over the last decade by AT&T and MCI would also be included.***
 - **RBOC executives and other observers forecast that RBOC vs. RBOC competition will accelerate and intensify as: (1) industry consolidation takes place; and (2) the RBOCs transform themselves into national and global full service providers. *This is a very controversial position with which non-RBOC commentators disagree.* Instead, the dissenters endorse another potential scenario in which the RBOCs use their regions as “fortress hubs” and do not compete with each in their core businesses or geographies (known as the “polite oligopoly” scenario).**
 - **In addition to inter-RBOC rivalry, the primary sources of competition for the RBOCs will be: (1) surviving CLECs operating as regional or niche service providers; (2) mobile wireless companies; and (3) cable MSOs in residential and small business markets.**
 - **The RBOCs remain vulnerable to a video-Internet access-telephony service bundle sold by the MSOs.** However, a critical unknown is the extent to which the MSOs can and will finance and manage the deployment, marketing, sale, and provisioning of such a service bundle.**

* Local infrastructure in an acquiring RBOCs home region would be divested to meet antitrust requirements.

** Market research shows a potential penetration level of up to 30% of urban households and 8-10% of businesses with 500 or fewer employees.

SUMMARY OF STRATEGIC TRENDS

5. **The first phase of the CLEC era ended with a bang that is still reverberating through the capital markets. Lost in the noise of so many failures is the fact that a strong demand remains for an alternative local service provider to the incumbent LEC.***
- **Surviving CLECs will be predominately facilities-based** and serve small and medium sized business customers. The survivors will function as regional or niche providers, *not* as “Integrated Communications Providers” on a *national* basis.**
 - **To be viable CLECs must: (1) have access to operating capital; (2) achieve a minimum level of scale economies; (3) develop a high loyalty/low churn customer base; and (4) follow a very focused business plan. One ideal CLEC model is an independent telephone company extending service into an RBOC’s service area.**
 - **The first phase of the CLEC industry was characterized by: (1) too much cheap capital; (2) very bad business plans; (3) poor management; (4) RBOC unpreparedness; and (5) inappropriate regulatory theories and actions. The most visible legacies of the first phase are bankruptcies, litigation, and the collapse of investor community confidence.*****
 - **Regulatory/legislative intervention to “save the CLECs” (e.g., divide the RBOCs into separate wholesale and retail businesses) will distract management (of both the RBOCs and the CLECs), confuse investors, and, potentially, become a major cause of delay in overall industry recovery.**
 - **Suppliers (e.g., network equipment manufacturers and professional services firms) built unneeded capacity to serve the collapsing CLEC industry. The suppliers themselves must now, in turn, consolidate and shrink.**

* While ILECs appear to have prevailed in voice-centric competition with the CLECs, they may have been victorious in the wrong war as voice traffic migrates to wireless and wireline competition becomes data-centric.

** “Predominately facilities-based” includes the operating model in which a CLEC leases LEC unbundled loops on a long-term or short-term basis, depending on the economics of the transaction.

*** Distressed CLEC assets can be purchased for 20¢ or less for each dollar on the CLECs balance sheet.

SUMMARY OF STRATEGIC TRENDS

- 6. High-speed Internet access adoption by residential and small business customers will fall below the original 2001 forecast.**
- The expectation is that the growth for 2002 and 2003 will also be below industry expectations. The primary causes of the shortfall appear to be: (1) price sensitivity under conditions of economic uncertainty; and (2) lack of ubiquitous DSL-based solutions in urban and suburban areas.
 - The original industry consensus forecast was 11 million residential and small business connections by year end 2001.* Current consensus estimates are for between 8.5 and 10.0 million by year end.
 - Analysts distinguish “availability” from “take rate.” Cable and telephone companies in combination claim that high-speed access *is available* in urban and suburban areas and that the *take rate shortfall* results from a lack of content and applications that appeal to consumers and small businesses. Conversely, companies in the content/applications businesses argue that high-speed access availability is either overstated or overpriced or both.
 - The reality is that the near-term demand for high-speed access will be driven by existing content and applications. Over the longer-term, new content and applications will be created as one of the results of the increased base of potential customers with high-speed access. The synergistic effect is that of a “virtuous circle” with access and content/applications reinforcing each other in a positive direction.

* FCC statistics show 5.2 million “high-speed” connections (i.e., 200 Kbs or better) at year end 2000 of which 64% were cable modems, 31% ADSL, and 5% other.

SUMMARY OF STRATEGIC TRENDS

6. High-speed Internet access (Continued)

- **The pace of high-speed Internet access rollout is more than an esoteric discussion because: (1) the conventional wisdom is that high-speed access will affect the economy favorably;** and (2) in the event terrorist activities force quarantine restrictions on personnel movements due to biological attack, dispersed work sites (including homes) with high-speed access will be required.**
- **Regulators and policy makers debate increasingly, whether slow adoption is: (1) a market failure that requires intervention; (2) typical at this point in time in the rollout of a potential mass market service; or (3) a situation that requires a Federal “industrial policy” regardless of whether the market has failed. The outcome of the debate will affect the nature and extent of government intervention.*****
- **The current dispute as to whether RBOCs must unbundle newly constructed fiber networks for sale to competitors will slow down the near-term deployment of telephone network-based high-speed access capabilities. This will have two effects:**
 - (a) Cable-based systems will become the method of choice for high-speed access; and**
 - (b) Deployment of fiber by the telephone companies to the neighborhood, curb, or home will be delayed indefinitely.**

**** Due both to the spending stimulus associated with the capital expenditures to build the networks and the benefits of expanded B2C electronic commerce.**

***** The range of potential government interventions includes: (1) tax subsidies for companies and/or homeowners; (2) direct subsidies similar to the Universal Service Fund; (3) removal of restraints such as problems with digital rights management (DRM) and rights-of-way; and (4) government responsibility for construction and operation of networks especially in rural areas.**

SUMMARY OF STRATEGIC TRENDS

- 7. The ultimate bandwidth-eating “killer application” will be video.**
- **Video applications will include:**
 - (a) **Entertainment video downloaded from the Internet as well as received over cable or satellite system;**
 - (b) **Business video including video conferencing (potentially from non-traditional work sites such as homes) and corporate training (real-time class room and user-initiated downloads);**
 - (c) **Distance learning for formal education (K-12th grade, post secondary and advanced) and personal improvement;**
 - (d) **Web-based video content used for everything from selling automobiles to on-line classified advertising;**
 - (e) **Video attachments to personal and corporate messages (including “instant messaging”); and**
 - (f) **Finally, video telephony which has a high approval rating from upscale demographic segments born after 1970.**
 - **The increasing prevalence of video-based content constitute a technology and market-driven discontinuity that facilitates entry by non-traditional companies, such as AOL and Microsoft, into the communications business. In a video world, the traditional carriers are disadvantaged relative to new entrants. To the extent the embedded network infrastructure is not video-capable, then it becomes transformed from an asset to a liability.**
 - **Transport technologies will include wired and wireless systems, the latter being both terrestrial and satellite-based. Carriers such as ILECs that are not video-capable will be disadvantaged.**

SUMMARY OF STRATEGIC TRENDS

8. The U.S. adoption curve for wireless data services will be much slower than the experience with DoCoMo's wireless Internet service in Japan.

- **The situation in the U.S. is complicated by extreme uncertainty as to the value and availability of 3G spectrum. Such uncertainty will persist until at least 2005.**
- **The 3G spectrum is occupied currently by a combination of: (1) broadcasters; (2) federal government agencies (including the Department of Defense); and (3) local school districts. All three present difficult technical and political issues that must be resolved prior to spectrum becoming available.***
- **Carriers must choose between alternative wireless data business models:**
 - (a) ***Traditional Model*: carriers provide an open platform and receive revenue primarily from traffic carried and some value added services (e.g., billing); and**
 - (b) ***Transactions Model*: carriers share in the revenue stream of content providers (i.e., the equivalent of an LEC sharing the revenue of Yahoo or AOL on the wired network).**
- **The risk of the Traditional Model is that the revenue stream, gross margin, and EBITDA may not generate a sufficiently robust ROI to justify the use of scarce capital. The risk of the Transactions Model is that carrier revenue demands and proprietary requirements will delay or stifle the development of the applications necessary to drive the wireless data business.**

* The September 11 attack and the current war environment make DOD spectrum untouchable in the near-term. Potentially some spectrum may become available through one or more of the following: (1) early migration by broadcasters out of channels 60-69; (2) agreement on the use of NextWave's spectrum; and/or (3) agreement on mobile use of MMDS spectrum.

SUMMARY OF STRATEGIC TRENDS

- 9. *Prices* for transport and switching will continue to move towards the *cost* of the most efficient provider.**
- Public policy will support this price movement despite the economic stress on carriers.
 - Extreme uncertainty exists currently as to baseline/equilibrium prices for telecommunications services. Short-term contracts tend to be the rule currently since large buyers are avoiding long-term commitments. The short-term (next six to twelve months) combination of: (1) excess supply; and (2) repressed/tentative demand reinforces mid-2003 as the earliest recovery possible.
 - Consequently, carriers will emphasize efficient, low cost operations and scale economies that, in combination, will generate high margins and positive EBITDA.
- 10. In pursuit of even higher returns on invested capital, carriers will stress diversification and “strategic partnerships” outside their core businesses.**
- Carriers will continue to experiment with diversification into content and e-commerce applications.
 - Some will be very successful; most will fail. This is a high risk strategy principally because the distinctive competencies associated with the content and e-commerce businesses are so different from the skill set that make carriers successful.

SUMMARY OF STRATEGIC TRENDS

11. The “surge era”^{*} in carrier network construction has ended.

- The “network” in the U.S. (as completed or funded *and* under construction currently) is more than adequate to meet demand forecasts through the middle of this decade. Capital expenditures will be curtailed back to approximate pre-1996 levels (on an inflation-adjusted basis). ‘Build it and they will come’ has gone.
- The drop is most obvious in inter-city networks which are overbuilt. Construction will continue for intra-city fiber networks but only for customer-specific builds with assured demand under signed contract.
- The focus now will be on achieving the carrier’s return on investment (ROI) that was contained in the business plans that justified the original network investment. (This may not be easy since many of these business plans relied upon excessively optimistic scenarios and associated financial forecasts.)
- The deployment of next generation carrier network technology will be delayed until the existing surplus of current generation technology is absorbed.**
- There will be substantial emphasis in the 2003-2005 period on rolling out “home networks” that are essentially local area networks for upper income households.*** Such networks will be video-capable and are expected to increase demand for “last mile” high-speed access service from cable and/or telephone companies.

* The surge era refers to the excess of aggregate capital spending on network construction and retrofit that occurred in the 1996-2000 period over the baseline 1991-1995 period in the U.S.

** For example, carriers with embedded circuit switched networks are disinclined to procure unproven softswitch technology when Class 5 switches have sold recently at less than twenty cents on the dollar.

*** Such home networks may be wired or wireless (possibly using the 802.11 standard).

SUMMARY OF STRATEGIC TRENDS

- 12. Economics dictate migration onto a single packet network for voice, data, image, and video.**
- **In the long-term, maintaining two parallel networks, circuit-switched for voice and packet-switched for data, is excessively expensive.**
 - **IP telephony is more economical due to lower hardware/software costs and the greater efficiency of packet transmission. Cost savings are estimated to be in the range of 30% to 50%.**
 - **Residential voice-over-Internet protocol (VOIP) service may be provided by “non-traditional” providers, *such as AOL and/or Microsoft.***
 - **VOIP drivers vary by customer segment and will be phased into service (2002-2006).**
 - (a) **Large businesses will build packet-based extranets and intranets in which voice will be integrated and quality of service (QOS) assured.**
 - (b) **Based on price advantage, small and medium sized businesses will purchase a package of VOIP and Internet access over DSL as a less expensive alternative to purchasing multiple voice and data lines.**
 - (c) **Residential customers will buy a package of video, Internet access and packet voice services from a cable TV company. As a competitive response to cable, LECs will sell a comparable package.**

SUMMARY OF STRATEGIC TRENDS

13. In order to conserve cash and survive, network technology companies (in particular) and the industry (in general) have decreased R&D expenditures in 2001, will continue to do so in 2002, and may not increase such expenditures until 2003 or later.

- **This will affect adversely the commercialization pipeline for new products and services in the 2003-2005 period (and potentially beyond).**
- **The venture capital (VC) community's reluctance to fund the telecommunications-related technology sector reinforces the R&D shortfall effect. The VCs see: (1) a declining demand for the technology; and (2) no viable exit strategy once the capital is committed.***
- **Radical innovations that on average take ten years between concept and market will be delayed or terminated prematurely. The full significance of this situation cannot be forecasted with precision, but its initial impact will occur in the last half of this decade.**
- **The cut back on R&D will affect disproportionately the future of small, independent technology companies that often combined seed money from established companies with other sources of capital.**
- **The emphasis will shift from new technologies *per se* to making existing technologies work together as reliable, cost effective systems.**

* An IPO or acquisition constitutes an acceptable exit strategy. Neither option appears realistic currently.

SUMMARY OF STRATEGIC TRENDS

- 14. The current situation could trigger a movement for more regulation, re-regulation, and/or legislative intervention.**
- **State and federal regulators tend to endorse “market-based solutions” in which regulators restrict their role to: (1) ensuring a level playing field; and (2) addressing areas where the market has failed. Given the current market situation, regulators have begun to identify “market failures” that potentially require some form of intervention. Examples of such alleged “failures” include:**
 - (a) A perceived “lack” of local competition as demonstrated by the financial failures of many CLECs;**
 - (b) The “low take rate” by small businesses and residences for “broadband” services;**
 - (c) “Underserved” rural and/or low income areas that do not have parity pricing and/or service availability with urban areas;**
 - (d) The apparent lack of spectrum for 3G services; and**
 - (e) The “excessively long” rollout of broadcast digital television.**
 - **Regulators are not comfortable with the Schumpeterian concept that the current period is one of “creative destruction” in which the shakeout-consolidation process is natural and a prerequisite to moving the telecommunications industry from one growth cycle to another. In effect, the failure of many CLECs, structural consolidation, and “slow” adoption of “broadband” by consumers are interpreted by many regulators and some legislators as the trigger for increased or re-regulation.**
 - **In the near-term, carriers that trust the market more than the regulatory/legislative process will put relatively more personnel and resources into regulatory reform/neutralization than was the case in the 1996-2000 period.**

SUMMARY OF STRATEGIC TRENDS

15. The potential for foreign carrier investment in the U.S. remains uncertain.

- **Success in the U.S. constitutes a prerequisite for a foreign carrier to be considered “global” and therefore credible to home country and U.S. corporate customers.**
- **However, major foreign carriers remain unable to adjust to home country competition and/or are crippled by the debt loads necessary to meet capital commitments (e.g., for 3G licenses and infrastructure construction). In addition, those that have tried U.S. entry strategies (e.g., BT) have made money on their stock purchases but failed to sustain presence in the U.S. market.**
- **A potentially viable strategy consists of portfolio investments in market segments (e.g, wireless or information services) in which the investing carrier has experience and can achieve effective control (e.g., DT in Voicestream).**
- **Experience to date shows that minority equity investments made in large U.S. carrier holding companies (e.g., DT in Sprint) do not meet the long-term business requirements of foreign carriers.**

SUMMARY OF STRATEGIC TRENDS

16. “Global carriers” that focus on serving multinational companies can be expected, at a minimum, to provide telecommunications services *between, among, and within* the countries of “The Triad” (North America, Japan, and Europe).
- Carriers have attempted one of two global strategies: (1) “on-net” emphasizing end-to-end services using owned-and-operated facilities (e.g., WorldCom); or (2) a “partner” arrangement between or among two or more carriers (e.g., AT&T and BT in Concert).
 - No carrier or carrier consortium can yet meet all the criteria for global service all of the time everywhere. However, some can meet many of the criteria most of the time somewhere.
 - The critical differentiator is the ability of a carrier to provide price-competitive services *between, among, and within* the Triad countries. This may be accomplished by means of owned/leased facilities and/or the facilities of a partner and/or the facilities of a non-affiliated local carrier.*
 - The France Telecom, Global One, and Equant combination is an example of the next generation global carrier that may just succeed.
 - Supply exceeds demand for undersea fiber capacity which creates a buyer’s market on many routes.

* To be price competitive when requiring facilities from a non-affiliated local carrier, a carrier must negotiate substantial inter-carrier price discounts (i.e., a wholesale rate based usually on minimum volume commitments).

Appendix B
Phil Richard's Backgrounder

Turmoil in Telecom

Discussion Piece Provided by Phil Richards, Insight Research

This is definitely a time of turmoil in the telecom industry. According to most of the data available:

- CLECs have largely failed
- Many of the fixed broadband wireless carriers have backed out of providing service
- Most of the new long-haul fiber carriers are in trouble
- Many ISPs are having difficulty
- Stock market valuations of both carriers and suppliers are dropping dramatically.

Against this backdrop, **is competition the real issue or is it survival?** Fortunately, there are a few positives:

- Broadband local access to the Internet continues to stimulate consumer demand
- The wireless customer base continues to grow with the potential of 3G promising a surge in usage
- Technological evolution appears to be maintaining its pace despite investor disinterest.

Technological advances are leading to rapid reductions in the cost of implementing communication services, but service prices don't yet reflect that. Consider:

- SDSL, offering 2 Mbps bi-directional bandwidth, costs a quarter of the cost of a T1 line.
- A dozen local voice lines using Voice over DSL are almost free, running over one DSL connection that is paid-for by a single data line.
- International long-distance calls are offered for just a few cents a minute. Yes, it's Voice over IP, but it will likely drive regular charges down to that vicinity.

Normally, this would suggest broad opportunities for competitors, but the capital to move in this direction is clearly very limited in availability now.

The key question is, how does the industry successfully move to a base of service revenue that is perhaps half of that presently being received. With all the classic local and long-distance companies fighting over this shrinking pot of funds, regulators are going to have to emphasize survival techniques rather than the niceties of competition. Today, the primary thing standing in the way of this dramatic revenue drop is lethargy. Most consumers are unaware of the service options that are available to them. The telecom managers in businesses are reluctant to risk changes when the bosses don't understand the new economics – don't be a hero, stick with the status quo.

Some positives do exist.

We project that Internet traffic will continue to grow rapidly as more users move to broadband local access and start using much more of the streaming technologies now available. **Indeed, we feel that the major demand generators for the Internet five years from now are not even imagined today, leading to local access demands well beyond the DSL and cable services offered today. And the purported fiber glut of today will quietly be more than used up serving these future connectivity demands.**

Will this increasing bandwidth demand create enough revenue to counterbalance the losses elsewhere? That remains unlikely, as the revenue per user from these expanding services is likely to shrink over this period even as usage builds. Among other flaws, the Internet has established itself as a largely free medium, with users willing to pay moderate fees for access, but little else. Users even object to the advertising that tries to help pay some of the costs. There have only been a few successes of revenue-based Internet services so far.

With this as a backdrop, what will be the stable of telecom competitors in the future?

Although their asset base is shrinking, the RBOCs and their ILEC friends will continue, albeit in a somewhat reduced form. Some of the long-haul carriers will disappear, likely swallowed up by other competitors or RBOCs. As the financial community comes out of the recession, a few new players will be getting financing to build creative approaches for providing service. Perhaps then, a new form of competition will emerge that needs the focus of the regulators to assure that it isn't stymied. For now, the damage has been done to the new competitors, so the country really needs the traditional player to survive. Does that mean they should be given free rein? No, but let's not also constrain them artificially.