

*The Many Facets of Technology Convergence in  
Telecommunication*

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Good morning, I am indeed honored to be invited to give the talk on several non-technical aspects of the technology convergence in telecommunication. What I would like to do today is to share with you of my views as a long-time observer of this industry.

First, some of you may recall it was only a scant fourteen years ago that AT&T acquired the computer company NCR in order to spearhead to what it thought was the future of telecom business. In the ensuing years, it also spun off its network equipment business into Lucent and made two key decisions to transform the company: one was to make a major push to enter both the wireless and the local telephone market, and the other was to acquire TCI, the largest multiple cable system operator in US. (The latter ended with the sale of its cable unit last year to Comcast.) When the then-CEO Robert Allen was asked of the rationale for the watershed NCR deal, he boldly predicted, “the companies that add the most value in handling transactions electronically from end-to-end, i.e. collecting, networking, processing and delivering information, will be the leaders in the global information market of the 21<sup>st</sup> century.” The acquisition of TCI, on the other hand, was carried out by another CEO, Michael Armstrong, who was also heralded as a visionary and reportedly was willing to bet the company’s future on the ultimate convergence of phone and cable in providing high-speed services. Sadly, neither the NCR deal nor the TCI deal succeeded in taking AT&T to the promise land and the company, once an American icon, has now weakened to the point that it was rumored last year as a

merger target. In fact, its wireless unit was recently sold to Singular which is a joint venture operated by no other than two regional Bells originally spun off from AT&T as a part of the divestiture process.

Yet in spite of the struggles experienced by corporate America during the last decade, the convergence of information and communication technology (ICT) has been occurring at a neck-breaking pace. Together with the PC and Internet, it has helped usher us to a new era of knowledge-based global economy. A new generation, for instance, of globally-distributed, ethnically-diverse, and operationally efficient micro-enterprises were created because information can flow almost instantaneously across time zones and national boundaries at practically zero cost. The vast electronic marketplace has allowed small companies to access the design, manufacturing, and marketing expertise previously available only to big businesses. One of the headlines appeared on the front page of the New York Times on the New Year's Day read: "India's Soybean Farmers Join the Global Village." The article described a for-profit trading company, ITC, Ltd., in India which established over 3,000 web-enabled locales called e-choupal, the Hindi word of village square, to allow farmers in almost 18,000 Indian villages to view not only the daily soybean price on the Chicago Board of Trades, but also local weather conditions, soil-testing techniques and other expert knowledge. And this is happening in a country when the majority of farmers are still illiterate!

The rapid transformation of the cable industry in US further serves as yet another example of how the ICT revolution has leveled the playing field. Started as a low tech, mom-and-pop operation, the cable industry did not take off until the seventies when it successfully utilized satellites to transmit

pay programs like HBO to its head-ends in order to provide consumers with richer program choices. The industry finally matured into a full-fledged industry after it successfully secured the franchise rights from municipalities to install a “second” line to households. This happened during the same time when phone companies started to replace the traditional trunk lines with low-attenuation fibers. The vision of video phones in every household inevitably led phone companies to conclude that cable industry will pose a serious threat to them since only the coax line installed for cable TV had the kind of bandwidth needed. Cable operators, on the other hand, were even more fearful of the phone companies given they are together less than one tenth of the size of their competitor. They knew in a monopolistic environment it was not inconceivable for a phone company to gain concession from the regulatory authorities to cross-subsidize the investment of fiber or cable to homes even though it lacks the near-term commercial justification. The battle line was firmly drawn even though one was in voice and the other, broadcasting and entertainment.

My own involvement in the cable industry started in 1986 when I joined the Board of Directors of then the second largest cable company ATC, after it was spun off from Time Inc. I served until 1992 and then as an outside director, helped negotiate its merger back to then Time Warner. As fate has it, I recently re-joined the new board at the Time Warner Cable, created indirectly as a result of the acquisition of AT&T cable unit by Comcast. Unfortunately time does not permit me to get into the details of these seemingly irrational and certainly confusing business transitions. But it suffices to say that while finance and regulatory requirement were the prime drivers for those decisions, technologies clearly was changing the underlying business model as well.

Let me be a bit more specific. Cable network traditionally had a tree and branch architecture where signals are transmitted and amplified one-way downstream into different branches before reaching individual TV sets. Sending signals upstream was never technical feasible nor needed. However, the network architect changed considerably when low-attenuation fiber replaced coax/amplifier system as the lower cost and higher performance alternative, and when cable operators started to look for new revenue streams that would require return signals of some sort, albeit at a much slower speed.

The use of digital techniques further alleviated many of the bottlenecks for two-way communication previously encountered when signals were in the analog format. Great strides were made by the cable industry in channel capacity and new data service, aided by the advances in compression technology and by the increasing use of fiber to the curb. As a result, most modern cable systems are now capable of delivering a thousand channels or more which by any measure far exceeds the market demand for broadcasting, and not surprisingly, cable operators are now pursuing data and video-on-demand services with vengeance. To wit: revenue from its high-speed Internet service at Time Warner, which was non-existent only five years ago, exceeded \$2 billion in 2003, or 30% of its total revenue even though the penetration rate is still low by comparison with its video services.

You may have heard that Time Warner Cable and AT&T among others will soon offer voice-over-Internet protocol (VoIP) service. Interestingly, cable operators could become a lower cost provider for voice not only because they can leverage the existing infrastructure, but also because the Internet itself has a very different tariff and fee structure.

Recent market study in Japan shows that customers are less concerned by the lesser Quality-of-Service (QOS) so long as the cost is low; a phenomenon not unlike the cell phones because of its mobility.

The excess channel capacity also provided cable operators the opportunity to offer on-demand services, initially for movie and special event, more recently with digital TV, for the large inventory of programs previously shown on pay channels like HBO. Their aim is to ultimately extend the on-demand service to all regularly broadcasted sports, news as well as entertainment programs. The concept of the latter is deceptively simple: a subscriber is allocated one or more dedicated channels on a demand basis to play back any specified program already stored on servers at the head-end. Such a service would leap frog the current state-of-art using stand-alone DVDs and services like Tivo. As in the case of downloading music, future success of the all-purpose on-demand service will depend less on technology and more on copyright and royalty. Nevertheless, to me the irony is not lost that a dedicated on-demand channel in concept is really not that different from a dedicated line in a telephone network.

Cable industry of course is not the only one marching toward an integrated service for audio, video and data though. Phone companies, with the advance in DSL technology, have in fact been able to compete with cable head-to-head on data service. They in principle could also enter the interactive and on-demand businesses by forming alliance with satellite DBS services. Furthermore, the economy of a fully-integrated service may finally be able to justify the installation of fiber-to-the-home (FTTH). The two industries, while initially engaged in two very different businesses with two very different network topologies, are now confronting

each other based upon the same premise of delivering an all-encompassing service. And that, ladies and gentlemen, is the direct result of the ICT revolution.

For those technologists and purists in the audience, I can already detect the debate as to which technology will ultimately win out. Let me remind you however, while cable modem appears to be the more preferred access device for high-speed services in US, the opposite is true in Japan. I suspect a major differentiator between the two in generating new businesses, however may be cultural than technological, given that cable was rooted in entertainment while phone companies, in communication. So, what are the lessons learned and what can we conjecture for the next decade? Here are some of my observations:

1. Convergence of information, communication and computer technologies will continue and it has leveled the playing fields not only in the context of industry sectors and size of business, but also among nations and their people.
2. Integration of voice, video and data, and expanded multi-media services will further define the ICT revolution. Bundling is now well recognized as the singly most critical marketing strategy due to inherent advantages in customer allegiance, in cross marketing and subsidizing, and in leveraging the infrastructure to lower the entry cost.
3. While technology is the enabler, the ultimate success of an ICT enterprise often depends on those less predictable socio-economical, political and regulatory factors. What happened to AT&T after divestiture is indicative of the basic nature of any revolution.

4. Technology invention and business innovation will be a company's most important assets. Success of an enterprise may be determined by its ability to shorten time-to-market, while gaining market share. It is unclear who should fund scientific discovery that leads to future technologies.

Looking ahead, there are at least two wild cards on the horizon in my opinion. One relates to the role of wireless technology in further integrating the multi-media service, and the other concerns with access versus privacy and security versus transparency. I believe the need to prevent identity theft and cyber terrorism is real and re-engineering of imbedded but less secured software systems may post a greater challenge than developing novel applications. Finally as we deliberate in this conference how we further push the frontier of technologies, we should remind ourselves that there are issues like consumer acceptance, regulatory environment, IP and copyright implication, competing technologies and public perception, not just technology that will define the success of a product. Thank you.