Remarks of
Michael K. Powell
Chairman, Federal Communications Commission
At the
Chicago Economic Club
"And a Child Shall Lead Them"
Chicago, Illinois
December 18, 2003

I want to wish everyone a happy holiday season. This a wonderful time of year, especially for children. Many of us are rushing around to find that special gift for our kids. Have you noticed that almost every special toy on their list seems to have a power plug or battery? Everything has suddenly gone digital.

Gone are the Lincoln Logs, Mr. Potato Head, and Etch-a-Sketch from the Christmas lists of our little darlings. No, instead their lists read like the procurement budget for a small IT department. They want Xbox, Playstation, Gamboy, DVD players, digital cameras, Palm Pilots and cell phones.

These gadgets are packed with massive computing power. That Xbox your son has his hands on is more than 17 thousand times faster than the computer on the Apollo Command Module that guided Neil Armstrong to the moon. And, more and more, this stuff is networked—in your house and to the world through the Internet.

We are witnessing the rise of the first "digital generation." Our kids are bathed in bits. As Dan Tapscott notes in his book Growing Up Digital, "kids are accustomed to the strong presence of technology in their lives and they will develop and superimpose their culture on the rest of society. They are learning, playing, communicating, working, and creating communities very different than their parents. They are a force for social transformation."

I have this new species of kid right under my roof. My two sons, Jeffrey and Bryan, are digital age creatures. I first noticed how far they had advanced from my own generation while we were cleaning out the basement. We were plowing through stuff when Jeff, like Dr. Leakey, made a fantastic discovery. He stumbled on a record player. He pulled it up, dusted it off and asked, "Dad, what on earth is this thing." I was not amused to realize that I was suddenly part of the elevator music generation. I explained what it was as best I could. He seemed curious about this relic, not quite able to piece it together.

Then Bryan, who was digging just north of the water heater, discovered a box of old records. He exclaimed, "Jeff, come quick! I have found the missing link." They pulled the black vinyl from its cardboard sleeve (even the cover seemed Neanderthal to these digital archeologists). I worked to explain how it all worked. They were dismayed you could not load it into a computer, or play it in a portable music player. They quickly lost interest, left the vinyl for dead and raced off to play Super Mario Brothers.

I sat there disoriented in the rubble and committed myself to study this new species, which I named Homo Digiteus. It's only a working title.

Let me share some of my experiences so far. Jeff, my oldest, will soon be 15 years old. He is a typical teenager. I asked him the other day what he wanted most, if he could have anything. He said a 1972 Chevy Chevelle. I thought, how wonderful, some things are timeless—a teenage boy who wants a classic car. Then he blurted, "but Dad, for it to really rock, it has got have satellite radio."

My teenager apparently has his first girlfriend. I say apparently because I rarely see her. They spend most of their time together in cyberspace. Instant Messenger is the new ice cream parlor, drive-in, or mall. I know this girl's smiley face icon better than I know her. It's not all bad. I figure as long as they are touching keyboards rather than each other, I still have time to talk to him about the birds and the bees.

Then there is my 9 year old Bryan—A digital Leonardo. This child expects nothing less than to be within arms link of some digital device and to be plugged into the net whenever he wants.

We recently experienced a hurricane in Virginia, and were without power for a few days. Bryan burst into our room grief-stricken. "What do you mean there is no power? I cannot play Xbox?" "No." "I cannot get on the internet?" "No." "I cannot watch a movie?" "No, Bryan the power is out. Go read a book, or play outside." He sulked away. I heard him get dressed and go outside. I thought "great, he will get some fresh air." Then, I looked out front and saw him and five friends piling into our Lincoln Navigator with a box of DVDs and some popcorn. He realized they could watch movies in the car.

Bryan hates television. I ask why and he responds, "it does not DO anything." To him, even the remote control is passé. He must command his medium.

One final story, before moving on.   Even quaint traditions, like the tooth fairy are in digital danger. Bryan wanted to know if there was a tooth fairy, after losing his last tooth. We said "yes", wanting him to keep this magic in his life a little longer. He went to bed. Late that night, Jane crept into his room to put some money under his pillow. Suddenly, a loud siren went off and Bryan popped out of bed. Jane screamed, "Bryan what is that!" He exclaimed proudly, "it is my tooth fairy trap." "Does it work, she said?" He looked at her with an air of superiority and said "It looks like it works to me, tooth fairy."

OK, so maybe my kids are a bit overboard, but they are not atypical. This world may seem completely foreign to us, but it is natural to them and provides a glimpse into the next decade when these Homo Digiteus become adults.

As scripture says "A child shall lead them." These children are our future. They will in a very short few years become the purveyors of commerce and society's consumers. They will be our workers and our leaders, our politicians and our voters. They are the key to our prosperity. They will leave their youth with breathtaking technological expectations—about the way to work and play.

Our mission is to prepare the way for them, for they are growing up quickly.

WHAT WE CAN EXPECT

Our kids and the technologies that they embrace shows us what our society will look like from a personal perspective and, by extension, what business will look like as it adapts to accommodate these new citizens.

The digital revolution is the most important economic development of our time. We must be guided by the fundamentals of technology in planning for tomorrow. In brief, two great technological trends have converged to change our lives. The first is the communications revolution. Every since James Maxwell codified the laws of electromagnetism, innovators have been developing more ways to communicate electronically. The basic principles brought us the telegraph and then the telephone. The radio and then the television.

The second critical breakthrough occurred when Robert Noyce and Gordon Moore first assembled a silicon computer chip. With the birth of microprocessor the world changed forever. We have all been witness to the explosion of computing power. As chips became faster, cheaper and smaller, entire new possibilities for data and information became possible.

The Information Age we now live in was ignited when computers merged with communications. Suddenly, there was a new language for communicating and it consisted of only two digits, zero and one. Put those two digits together in one order and they are a picture taken from your digital camera, put them in another order and they are an MP3 song. Your messages could now be converted into computer language. As such, they could be manipulated and controlled rather than just repeated. A photo can be improved (cutting out an old girlfriend for example) and sent to grandma. A video clip can be stored on your computer and watched when you are ready. Music, as the industry painfully learned, could be copied and shipped around the world—and not just by Sony's shipping department.

Just think of the explosion of innovation that has sprung up in just 25 years. Email, instant messaging, digital cameras, eye-popping video game consoles, plasma televisions, cell phones that got smaller and then got smarter, home networks using free wireless spectrum and low cost devices, music sharing programs, Palm Pilots, Blackberrys, satellite television, and digital television. Most importantly, all of these mini-computers can be attached to a network. They can find each other. They afford users unprecedented access to information from around the world, allowing them to shop

from any store, or get medical advice from a doctor a thousand miles away. Personal power had arrived.

If one understands the fundamental drivers of technology—Silicon, Storage and Speedy access—you see how our lives will continue to change. The computer gets smaller and more powerful almost by the day. And, storage of information gets cheaper and larger by the hour. This is driving ever more powerful devices into smaller, cheaper forms. Thus, we now see an explosion of consumer electronic gadgets that are putting massive amounts of intelligence and power in our hands. Just consider that the Ipod music player, barely larger than a credit card, can store the entire contents of the ancient library at Alexandria and have enough left over for enough songs to play for two weeks without ever repeating a single song.

As the technology continues to evolve, computing will become pervasive, indeed invisible. I recently visited a lab working on smart dust—tiny little sensors equipped with a radio. Such devices can be scattered (like dust) almost anywhere and collect and transmit minute changes in environment. These devices are being used today on grapevines and in forests to measure conditions for optimal growth.

To boil it all down, more and more power will be shifted to individuals. Traditionally, in communication services, a corporate carrier and a regulator stand at the center of everything. The service provider controls the brains of the network and regulators set the rules. The carrier makes decisions about when your phone rings, what number you will have, what services are available to you and at what price. Your telephone is a dumb machine. You have little role in this system other than to pay your bill.

The Internet paradigm puts more of those choices into the hands of individuals at the edge of the network. Thus, as smart powerful devices go from your desktop, to your lap, to your palm and beyond you will be able to connect them to a network capable of reaching out to any source in the world. This is a radical departure from the cozy world of telephone regulation. Consumers, like our children, will be more in command. The Internet paradigm promises more choices for service, more flexibility, and cheaper rates.

With a smart machine and the Internet you also get more personalized service. We have already seen this trend in computer products. PCs are made to your specifications. Websites allow high degrees of customization. Amazon.com is cool, but MY Amazon is tailor made. You see the books you like and the DVDs that you like. The more you use it, the more it breaks in like a comfortable leather jacket. This high degree of personalization is now moving to communications products and services.

Take the cell phone. It is transforming voice communications, in part, because it is a more personalized communication device. It is mobile and goes with you everywhere. The type of phone you choose reflects your personality—flip or candy bar style. Changeable faceplates are available to suit your mood. Programmable interfaces with wallpaper of your choice. Who would have imagined that folks would pay good

money to download personalized ring tones? You can even set up different rings for different people in your lives. Even billing packages offer you plans that fit your lifestyle. Compare these features with those of the phone sitting on your desk.

Now consider trends in television, the ultimate mass medium. Thirty years ago, you had basically three choices—CBS, ABC and NBC. You had to watch the news at the appointed time or you missed it. It was a one way street; the network picked what you watched and when you watched it and you just sat there. We even coined the phrase "couch potato" to describe our lethargic experience. Cable brought more choices built around smaller, more diverse interests. You still could not pick exactly what you wanted at a given time, but you could be guaranteed to see a particular type of programming. On the History Channel, you find history. ESPN is dedicated all day to sports. And our kids watch children's programming almost exclusively on Nickelodeon, Disney Channel, WAM! and Cartoon Network. Cable is now moving to offer interactive services, movies on demand and personal digital recorders to further personalize service.

Look now at the Internet and devices like TiVo. People do not make appointments to work or to be entertained. They have, and will have, an enormous library to choose from on demand. They will pick what and when they will watch or listen. And, more and more, they will choose what form they will do that in.

Witness also what we have seen in music. Users can sit down to a smart machine and listen to hundreds of radio stations around the world. Perhaps your old college radio station for old time's sake. Or perhaps you want to download the song you danced to at your wedding. Or, better yet, burn it to a CD and play it in your car on the drive back from a romantic dinner. Or still better, load it on your Apple Ipod or Rio player and keep it with you all the time—no, take all 4000 of your favorite songs with you all the time!

This personal innovation trend is now breaking into the once impenetrable world of voice communications. In addition to substituting for voice calls by using email or instant messaging, more and more you can use a voice over Internet product or service. You can download for free a piece of software right now and call people over your smart machine, almost anywhere in the world, bypassing much, if not all, of the traditional phone network. VOIP providers are now offering services that use the Internet to bring consumers a bevy of personal features. With an Internet phone you can log in at any location and have your phone ring at that location using the same number. You can tell your IP phone what hours not to ring, say at dinner. You can pick an area code from your home town and use it in another state. The possibilities are endless and they are brought about by the same forces—powerful silicon chips, storage, and speedy access to the Internet. These services are quickly coming to market.

The FCC fully embraces this direction. We look to the Internet, entrepreneurs and technology for the world of tomorrow, rather than the telephone, monopoly and dated regulation.

At the FCC, we embrace the vision of tomorrow that gives individuals the freedom to be in control. Just in recent months we have passed local number portability rules so a user can keep her personal number when switching services—personalization. We have provided more unlicensed spectrum, so that innovators can use it to make low cost computing and communication products that let consumers network devices in their home and access the Internet without wires. "Hot spots" have sprouted where we dwell—Starbucks, hotels, public parks, airport lounges are all places you can wirelessly connect to the Internet. Sales of WiFi chips grew from five million in 2000 to an estimated 35 million this year.

We have promoted technologies like ultrawideband that soon will let you get rid of all those pesky wires and connections in your home. Buy a flatscreen TV and a surround sound system and they will just have one cord to plug in for power. The TV on your wall might actually look like it does in the advertisement.

Now, I know what many of you are thinking. We heard this talk before during the dot com boom. It flopped.

Things looked wildly exciting in just a few years. Companies were changing their names to strange, glowing symbols of the new, new thing. "E" became the only letter that mattered in the alphabet. The Old Economy was out, replaced by the New. And even that venerable punctuation mark, the period, got a hip make-over, becoming the "dot!" and rejecting as passé just being known as the punctuation mark formerly known as period."

After the crash, we all retreated to do our penance for being so wild. Back to fundamentals and hard-soled shoes. Risk taking became a thing of the past. Many secretly enjoyed watching 25 year old millionaires crumble and return to jobs at the Dairy Queen dishing out soft-serve cones.

Yet, despite the crash, technological advances marched relentlessly forward, undeterred by a sluggish economy, war or disease. The microchip continued to increase in speed at an astonishing rate. Memory continues to double and triple while prices fall. Optical technology surges forward as photons work to overtake electrons as the mail carrier of communications, just as Patent Clerk 2nd Class Albert Einstein imagined.

We have seen nothing more than the classic boom-bust cycle of new technology. But it is always followed by a golden age, just as it was with railroads and other new technologies. As our economy briskly recovers, we are poised for a golden age of information technology. And, we have a coming generation of early adopters that will be ready to drink it up.

WHAT BUSINESS CAN EXPECT

Businesses will face great opportunities, but serious challenges as well. For starters, there is an entire generation of early adopters emerging. These kids will try out

new products and services and take risks that their elders are reluctant to. Many young people, for example, are cutting the cord and not subscribing to a local or long distance home telephone service. Instead, they have made their wireless phone, with its highly personalized attributes, their only phone.

The Homo Digiteus child is comfortable with this technology and they present enormous opportunities for new markets, new products, and new services. But, beware. If you do not move to serve their needs in the way that they require, they know how to use the technology to help themselves.

The best example is clearly Napster. I do not think most teens want to break the law. They do, however, insist on buying individual songs at low prices, or free as the case may be. Again, they want to program the album and assemble songs in collections to their liking. They do not want the record label putting 1 great song in a package with 10 crummy songs and forcing them to buy the whole thing at ridiculously high prices. If industry will not serve that need, this generation will do it themselves. Nineteen year old Shawn Fanning invented Napster because the record labels didn't. While the record business will fight back, they may have lost a whole generation of consumers that have come to expect free music.

Digital also means providers can invade other markets that their infrastructure long kept them from. Cable companies can use their fiber network to deliver telephone service to their customers, as well as data services and video services. Phone companies can offer higher value content services over their DSL lines—including video. It will be challenging for them to branch out from their core, but the opportunity is there for a bold CEO to snatch.

To realize these opportunities, companies will have to surmount major obstacles. First, the digital migration means that companies that grew up in the analog world have to reinvest in and rebuild their infrastructure in order to compete with new digital-age companies in providing the new services that consumers and businesses want. The dilemma for an incumbent is that they have to invest capital today to generate uncertain revenue tomorrow that may cannibalize today's business. They have little choice, however, for if they don't someone else will and they will be dead. This is a classic innovator's dilemma.

The march is on. Cable companies have had to rebuild their networks to compete with digital satellite systems. Telephone companies have to upgrade their copper voice lines to compete with cable TV's broadband service. Television broadcasters have to replace their analog service with digital television to compete with cable and satellite. All this investment is critical if one hopes to have any chance to compete for the business of the digital generation.

Second, competition in communications is going to be brutally intense. This comes not just from a policy that now favors competition over the state-supported monopoly model, but more dramatically it will come from the rapid technological erosion

of the walls that separated different industry segments from each other. Not long ago, you would have said SBC is a telephone company. Comcast is a cable company. T-Mobile is a cell phone company and NBC is a television company. They enjoyed near-monopoly positions within their lanes and had no significant cause for concern from companies in other lanes. But with digitalization transforming all communication services into data applications that can run over any platform, these barriers will fall revealing new and formidable competitors. Any player with a digital platform can now provide almost any form of human communication.

But you ain't seen anything yet. The Internet threat is even greater. Over the Internet, applications are separated from the infrastructure. Now, services can all be software applications that ride over the platform as bits. A consumer can download a piece of software over a broadband connection and set up their own communication channel. Your kids have done that with programs like AOL Instant Messenger and Skype. Voice, video and data all can ride over Internet networks easily, and will.

The fact that applications are divorced from infrastructure means companies like Microsoft, Intel and Apple are suddenly competitors to traditional communications companies. Apple, for example, sells a high quality web camera that combined with free software enables very easy computer to computer video conferencing to anyone with a broadband Internet connection. All for $149. What did any of you pay recently for video conferencing services? The once vaunted picture-phone the phone company promised has finally been delivered by the Internet industry.

Third, innovation will be the most important driver of success. Most telephone companies and cable companies are accustomed to mature, high quality networks. Innovations from the phone company over the years has been (shall we say) leisurely. While *69 and call waiting are fine, we can expect much more in the Internet environment. Because the software world and the computer world follow Moore's Law, innovations will come more rapidly and from many more sectors. Companies will have to operate faster, more nimble organizations. They will have to get comfortable with greater risk taking and with failure. They will have to invest in research and development. Small companies unburdened by a legacy network will spring up constantly and attack. Products will have to be reinvented regularly. This is a sea change for traditional communications providers.

At the FCC we are moving in a direction that embraces revolutionary change. We know we have to help get broadband built and deployed to every American. We are 10th in the world right now, an unacceptable position for the world's leading economy. We are trying to change that. We have adopted policies that provide incentives for building fiber to homes, by limiting unnecessary regulations so that entrepreneurs can focus on their work and not on filling out regulatory forms and hiring lobbyists. We have particularly explored opportunities to lower regulatory barriers in rural and underserved areas to further promote wireless Internet deployment where it may be the most efficient path.

We have pushed for more platforms that can deliver digital: We believe in getting multiple digital pipes to the consumer—Cable modems, DSL, WIFI, Fixed Wireless, Powerline networks, satellites and anything else that emerges from the innovator's garage.

These policies will drive investment and growth in the sector as companies must reinvest to adapt and compete. We see the beginnings of this process, according to the Department of Commerce, IT spending accounted for more than a fourth of economic growth for the first three quarters of 2003.

We also understand the continuing challenge of protecting our citizens from those who wish us harm. We push for more facilities-based competitors, in order to have redundant networks, so that if one is knocked out, there are alternatives. We have supported efforts to develop best practices that can better secure our networks.

We see the need to better empower police and fire departments as the first responders in an emergency. We have released more spectrum for use by first responders, which will help them communicate with different departments and agencies that must respond to a crisis. We are driving the wireless industry to deploy E911 services that can pinpoint the location of a caller in need. We have expanded programs to support tele-medicine in rural communities so access to a top doctor is not just something accessible to the well-to-do. These efforts mean technology will not just touch lives, it will save lives.

BENEFITS TO OUR NATION

The 20th Century was the American Century. It was not just the triumph of democracy over communism, but the triumph of free market capitalism over central-planned economies. Now we turn to the future and ask how we will fare in the 21st Century. Will we forget the lesson we learned, that the free-market is the kiln where invention and creativity are fired—a place where risk, well-executed, is rewarded.

With the arrival of new markets and new services will come great opportunities for growth. The deepening deployment of information technology is leading to greater productivity. From 1989 to 2001 IT intensive industries experienced average annual labor productivity growth of over 3% -- compared with 1.6 % pace of the overall non-farm economy. The United States remains the global leader in IT exports, topping 1 trillion dollars in 2002.

The jobs our children will need will be created in fields that demand greater technical skill. The need to maintain technological superiority is vital to keep the upper hand against a cunning and innovative enemy intent on harming our people.

However, all signs do not yet point in our favor. Rather than being first in the world, we lag badly in broadband deployment. More and more jobs dependant on this 21st century architecture are going off-shore to China and India. And, we risk worsening

trade deficits if more and more products and services that could be produced here at home are driven to other corners of the world, where our citizens can order them just as easily as if they were down the street. A revolution is rarely government led. We must place our faith in entrepreneurs and not extinguish the burning energy of innovation with the wet blanket of over-regulation, as some seem to prefer.

The Information Age should be a period of great glory for the United States. We have always tilled the richest soil for innovation and entrepreneurship, the clear touchstones of the next generation. The premium we place on individual freedom and empowerment are culturally suited to the characteristics of this technology age. We need a national commitment to embrace the potential of the next century and drive it forward. Our children have sampled the promise and we must make for them a world in which they can work, learn, play and communicate in the manner that they are used to and that they expect. They deserve nothing less as the heirs to the American Dream.

Happy Holidays, God Bless and Thank You.

- FCC -