

hyperpeople

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If the doors of perception were cleansed
everything would appear to man as it is:
Infinite.

William Blake

The Marriage of Heaven and Hell

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introduction

all that jazz

Somewhere in my junior year of high school, I visited a friend who lived many miles into the deep woods which make up the bulk of rural New England. A short time after I arrived, I stumbled into a hallway which connected the front and rear halves of her residence. The hallway, perhaps 40 inches wide, was only just barely wide enough to walk through, because, for all of its length, it had been completely covered in shelving. On those shelves sat more record albums than I'd ever seen before (except in a record store), all carefully packed away into clear plastic sleeves which protected the delicate vinyl albums from the vicissitudes of time, dust, and clumsy teenagers. My friend – who ignored the collection, in the common way teenagers pointedly reject their parents' hobbies – dryly responded to my open-mouthed admiration by telling me that although there were well over 10,000 albums in her father's collection, they were *all* jazz recordings. In an instant, something that had seemed endlessly intriguing had been transformed into a curiosity. Sure, that's a lot of albums – but what if you didn't want to listen to *any* them? (In later years I have grown into an appreciation of jazz, but as a teenager in the late 1970s I cared only for punk and new wave music.)

Despite the disappointing choice of genre, I was struck by the sheer number of offerings. If you listened to every album, each an average of 40 minutes in length, you'd go through at least 400,000 minutes of music. (There are 525,600 minutes in a year.) Back in the 1970s, before the advent of Sony's Walkman, you had to be close to a music collection; you couldn't take it with you. So you'd be stuck in this house in the sticks, moving through the collection, eighteen hours a day – for an entire year! – before you'd heard all of it. For a jazz aficionado, this prospect would sound a lot like heaven. Instead, we focused on the 30-or-so albums my friend owned, and played a few of those on her father's deluxe sound system.

Times have changed. Today (the 18th of December, 2004) I sit in a café in Sydney's central business district, typing away on my Apple iBook. I've got headphones on,

and I am listening to some music from my own collection – a collection that I’ve been building for nearly thirty years. That entire collection, nearly 5000 songs drawn from over 500 albums, sits on the iBook’s hard drive, and I can listen to any of those songs anytime I want, anywhere I want. You might think that 5000 songs would be enough, but it isn’t. I’m constantly adding to my musical collection – as are most of us, most of the time. The size of my collection of recordings is bounded not by the size of the iBook’s hard drive, but by my pocketbook. I could go online (this café offers wireless Internet service) and instantly grab almost any song I could imagine through Apple’s iTunes Music Store (iTMS) for a dollar apiece – and iTMS has about 700,000 songs for sale. I could access an Internet service such as Rhapsody or Napster, which offers me the ability to listen to any music in their collection (several hundred thousand songs) for a monthly subscription fee. Or, if I wanted to violate federal and international copyright laws, I could launch one of several programs I have installed on this computer and get this same music from others who have offered up their private collections for public use. One way or another, I now have nearly ubiquitous access to more music than I could ever hope to listen to. The moment of astonishment I experienced back in 1979 has become a permanent state of affairs in the early 21st century.

Everywhere around us we are presented with an embarrassment of riches. This wealth isn’t confined to recorded music; today, many books are available online through the Gutenberg Project, a not-for-profit effort to translate the world’s “Great Books” into easily accessible, free-to-all electronic libraries. Earlier this year the Project announced the availability of their 10,000th title, a translation of the Magna Carta. Just a few days before these words were written, web search giant Google announced an initiative to scan millions of books from the scholarly collections of Stanford, Harvard, and the New York Public Library. Google plans to make many of these texts freely available online – a project so big that it will take the better part of the next decade to complete. And that’s above and beyond the roughly *eight billion* pages of web-based information accessible through Google’s search engine. (By the time you read these words, that number will undoubtedly have grown by a billion or two, or ten.)

While the transformation of recorded music in the digital era has been the focus of so much endless argument – generating more heat than light – few seem to have noticed how the written word has undergone an even more amazing transformation. We think nothing of having information “at our fingertips,” the answers to all our questions no more than a few keystrokes away. Why does such an exceptional turn of events feel so natural to us? How is it that we barely acknowledge something so profound that it has transformed the way we work, the way we live, and the way we think?

In some ways we have grown a bit jaded – not through any fault of our own, but because we’ve grown used to an endless stream of marvels. This *is* a marvelous age. But it does not end there. Marvels, whether ancient or modern, have the capacity to enchant us, and an enchantment transforms the enchanted. We are not precisely the same people we were before we began using Google, or iTunes, or any of an increasingly long list of wonders. Each of these leaves its mark upon us, almost a sort of internal tattoo. In these marks we can see the shape of the new world which is growing up all around us, a world shaped by the spells cast by these marvels as they work their magic. This book is an attempt to understand the cumulative effect of all this modern magic.

sink or swim

Today is my nephew Andy’s 2nd birthday. I was present in the hospital in San Diego the night he was born, and dutifully shot video footage of mother & newborn, drove back home, uploaded it to my computer, crafted a short film, then sent it out to all of my relatives and friends, so they could rejoice, even from afar, in the inherent cuteness of tiny fingers curling and the scrunched-up moue on Andy’s face. His grandparents, his great aunts and great uncles, all of them downloaded the video and watched Andy’s first day of life.

For the past year I’ve been living far away from Andy – in Sydney, very nearly as far from Southern California as you can travel. I stay in regular communication

with his parents – my sister and brother-in-law – via email, leavened with an occasional phone call. Although I’m far away from them, I am reasonably well informed about the day-to-day details of their lives, and the lives of my two nephews – both of whom are yet too young to be sending their uncle electronic mail. So, until they grow a bit older, and learn the ways of the Web, I’m effectively cut off from them. That’s a constant bother because both of them are at that age when every day makes a difference, and a year – which passes quickly for me – seems like a lifetime to them. For now I am like a welcome stranger, who visits at incredibly infrequent intervals throughout their lives. That is the tyranny of distance.

This year I wanted to give something to Andy which would remind him that his uncle is out there, and wishes him a very happy birthday. So I asked a friend to use my mobile phone to shoot a short video sequence of me singing the “Happy Birthday” song for Andy. From the phone I sent an email of the video to my sister and brother-in-law, who dutifully played it for him. (I later heard that two-year-old Andy reacted with confusion – how did his uncle get into this laptop? His brother Alex, now three, delighted in it.) That video birthday card may not have meant much to Andy, but it meant a lot to me.

A half a century ago emigration to Australia meant a complete cutoff from the ties of family, culture and nation. In the days before jet aircraft, the journey to Australia took several weeks, and even today the postal service takes a week to deliver a letter somewhere else in the world. But I can be at Andy’s front door about 15 hours after I leave my own Sydney apartment, and I can send him a video greeting just a few moments after I’ve recorded it. We are all much closer together – and this is not news; we’ve arrived in Marshal McLuhan’s global village right on schedule. I can live my life in Australia with a fair awareness of what my friends are up to in the United States, or Europe, or Africa. I can write them email or send them video clips or even videoconference with them, all from my iBook. It’s not the same as being there, but it is far better than anything we’ve ever had before.

We are connected continuously, if tenuously, by the increasingly pervasive webs of digital communications technologies. And we’ve reordered our lives to

accommodate these innovations. Many businesspeople spend a few hours a day reading and responding to electronic correspondence. Most internet users spend at least a few hours a week on email, and some spend several hours a day at it. We have become prolifically epistolary; even if our emails tend to be brief, they are far more frequent than ever before, and this up-tempo in our human interactions is having a cumulative effect. For example, certain individuals, because of their profiles, have become deluged by email. Bill Gates reportedly receives four million emails a year, and uses an army of computers and humans to filter these down to the few thousand which might demand his attention. It somehow seems very appropriate that the world's richest man should be the target of so much electronic attention: Bill Gates is at the center of the worlds of technology, commerce and philanthropy; his thoughts and decisions can have a profound impact on millions of people. His import and his electronic accessibility (billg@microsoft.com) have made him a natural magnet for a flood of communication only a billionaire could cope with.

Bill Gates is just the extreme case of the world we're all entering. Already many of us are drowning in electronic correspondence. WIRED news reported that Lawrence Lessig, the Stanford University Law Professor and perhaps the most prescient thinker on the legal issues raised by digital media, suffered a similar email meltdown in February 2004, and calmly shelved about a thousand emails that he finally admitted he'd never get to. Lessig has now arrived in the place where Bill Gates has been living for years – and it's the world that will soon be home for all of the rest of us. Sometime in the middle of 2004 I realized that I couldn't actually answer all of the email I was receiving – but I've yet to work out an effective system to establish the priority of my emails, so they just sit in my inbox, demanding answers they'll never get, and making me feel guilty for my failure to respond in kind.

We have been sending a constantly increasing flow of electronic correspondence every month since the Internet was invented; eventually we will all be drowned in that flood. Of course, some of this correspondence is unsolicited “spam,” but much of it is vital, and that too is increasing, both in volume and in importance. Consider: there are now roughly a billion people on Earth with internet access;

within a decade most of them will be confronted by a hyper-connectivity which, if nothing changes, will render the Internet useless. The popularity of the Internet will destroy its utility.

The pressure of human communication, accelerated by digital technologies, seems intent on propelling us into a coming collapse. But pressure can also have a positive aspect – human beings under pressure regularly produce the unexpected. We haven't yet found a crisis so big that we couldn't solve it – the proof of that is that we're all still here. We will find a way through to an age of hyper-connectivity. That way through, into new forms of human connection, is another subject of this book.

no fate

This book is not about the future. It is not my intention to describe some utopia, or its diabolical inverse, which we are hurtling toward. Instead, I will focus on events occurring at the present time, not in some far-distant future. The favorite words of futurists are, “in twenty years...,” because that's far enough away from the present as to banish the taint of failure. I am not a futurist; although I have been given that appellation by others, my sole gift, insofar as I claim any ability, is that I can see the present with a somewhat greater than average clarity. Two of my intellectual forebears – whose works have been an enormous influence upon this one – were called futurists, but were, in fact, keen observers of the present.

Marshal McLuhan, the 20th century giant of media studies, left us phrases like “global village” and aphorisms such as, “the medium is the message,” but died before the age of the Internet, which he would have understood better than most. When you boil down all of McLuhan's rich rhetoric – he was first and foremost a student of language – one irreducible assertion remains: *every experience of media leaves a permanent impression upon us*. Media change the way we perceive the world, transforming the way we think, feel, and behave. As I lay out my arguments in these pages, this basic discovery of McLuhan's – which he claimed he'd learned

from Shakespeare and William Blake – will resurface, again and again, providing a through-line which will help to make sense of events which, on their surface, seem entirely distinct, but are, in reality, all of a piece.

McLuhan's term "global village" is bandied about with abandon these days; connected a dozen ways through invisible networks of information, people often see themselves as part of a planetary community. Yet community is more than connectivity, the simple exchange of information; community implies organization, anywhere from rigidly hierarchical to anarchic, or, as in most cases, somewhere in-between. Organization serves as the basis for action-as-a-whole. It is action that defines a community; communication may keep it knit tightly together, but if communication fails to translate into action, the community is little more than an electronic mausoleum. "The medium is the message" means the actions of a community will differ in kind if that community is connected via telephone rather than radio, or email rather than television. They may all be communities, of a sort, but the scope and quality of their activities will differ widely. The recent digital technologies of communication have evolved toward intensely individual forms, and these media engender very different types of community action than the mass media which preceded them.

The noted "futurist" Alvin Toffler described the emergence of the connected individual a quarter of a century ago in *The Third Wave*. Toffler didn't predict the future; he took a magnifying glass to the present – the late 1970s – and examined the transformation of human experience produced by a radically "demassified" media. Demassification is a two-dollar word which means, at essence, the media each of us encounter are becoming more and more individualized, tailored for the needs and tastes of the individual. The industrial era produced newspapers, broadcast radio and television networks, the archetypal forms of mass media. All of these, Toffler announced, were rapidly giving way to a situation where hundreds of televisions, radio stations, and magazines would compete for our attention in a way we'd never seen before. It seemed like futurism when Toffler prophesied the age of demassification; now it seems almost trite. But Toffler wasn't looking into a crystal ball: he was looking at falling television ratings, dwindling newspaper

subscriptions, and analyses of consumer behavior. People want more choice, Toffler announced, and they're getting it.

None of this demassification seems at all extraordinary today. When we turn on a television set, we expect to find a hundred channels to choose from; satellite radio gives us at least that many listening options in our automobiles; the World Wide Web gives us access to thousands of professional news sources, tens of thousands of "amateur" web logs ("blogs"), news feeds and commentary pages. Although it may seem as though the day of demassification has arrived, it has not really begun. The enormous transformations of the last twenty-five years are as nothing to the changes sweeping across the world of media at this moment. The repackaging of mass media into slightly more individual versions – which still manage to capture audiences in the tens of millions – are simply the last fevered strokes of dinosaurs desperately trying to outswim an approaching tsunami. The days of the mass media are already over. True demassification has begun.

I write this work forty years after McLuhan wrote *Understanding Media: The Extensions of Man*, and a quarter of a century after Toffler's *The Third Wave*. I make no claim to the intellectual genius of either of these two giants, but I do stand further downstream; upon their shoulders I can hope to see more and more clearly than either could in their own day. The river they charted has grown fast and turbulent; there appears to be a precipice directly ahead where the water drops away entirely, into a mountain of foam and spray. It is that trip over the approaching cataracts which is the central subject of this book.

In retrospect, great transformations seem the most natural things in the world. But in the moments leading up to them people are often confused, afraid, and suspicious. When the familiar ground has given way, some people become conservative, clinging to what they know, or believe they know to be true. Others embrace the chaos without a second thought, only to find themselves mired in dangerous quicksands. This book advocates a "middle path," between these two extremes. It is not enough to know that this enormous change in human communication is underway; it is not enough to know that the way we communicate will create corresponding changes in human being and human

culture. This knowledge must be applied, individually and culturally, to create the sustainable human cultures of the 21st century.

We are being presented with a rare opportunity: in the transition from one culture to another, can we face the future, eyes open, and decide what kind of world we will have for ourselves? In this examination of the details of the present, the shape of the future has been revealed. The future is already with us. It lies with us to decide what to make of it. There is no fate but what we make.

Mark Pesce
Sydney
December 2004

one

the world is
my hard
drive

the day tv died

At the time, Monday the 18th of October, 2004, seemed an unremarkable day.

Around the world news outlets reported on the rapidly-approaching presidential election in the United States, or the latest attacks by Iraqi insurgents. In the United Kingdom, television network Sky One (on News Corporation's BSkyB satellite television service) continued to hype that evening's premiere of a new television series. Or, more precisely, the modern remake of an old TV series. The original *Battlestar Galactica* premiered on the American Broadcasting Corporation television network back in September 1978, a response to the enormous popularity of *Star Wars*. Starring Lorne Greene as "Adama," commander of the eponymous starship, the series was, briefly, a huge hit for ABC. But it was painful, half-baked, and schlocky in the way only bad science fiction can be. The plots owed more to the Cowboys-and-Indians serials of the 50s than anything emerging in the "new" science fiction, in films such as *Silent Running*, *Alien*, and *Blade Runner*. That didn't stop an entire generation of schoolgirls – my sister included – from falling in love with Dirk Benedict, who played the raffish fighter pilot "Starbuck". For the under-12 set, *Battlestar Galactica* was must-see TV.

In 2003, the SciFi channel, an American cable television network, commissioned a film based upon *Battlestar Galactica*, based on a strong script written by two thirty-somethings, Ronald Moore and Christopher Eric James, who had been huge fans of the show back when they belonged to the under-12 set. Moore and James fully understood that the bar for science fiction storytelling had moved; after *Star Trek: The Next Generation* and its sequels, *Babylon 5*, and *Stargate SG-1*, audiences expected more realism from their characters, more fantastic special effects, and a harder edge to the storylines. This *Battlestar Galactica* took a cue from *Alien* – its universe was gritty, dark, and dangerous. The dreaded Cylon menace had taken human form – through some clever biomechanical engineering by the Cylons – and now the leading Cylon warriors were buxom blonde *babes*. It seems ridiculous, until, in an opening scene, one of these cyber-vixens sanguinely snaps the neck of a crying infant human. A few onscreen minutes later the Cylons stage a surprise attack, nuking all the worlds of the human federation, and chaos ensues; an ugly chaos, the

a screw-the-women-and-children-first-I'm-on-this-spaceship-out-of-here sort. It's a raw telling of a horrifying story – the extermination of the human race – and all of the main characters bear their wounds, psychic and physical, openly. In short, the new *Battlestar Galactica* took the core of an old idea, and made something very compelling from it.

The four-hour film premiered over two days in December 2003, and did so well – the 2nd-highest rated program ever on SciFi channel – a series of 13 episodes was immediately ordered. These episodes were filmed over the first half of 2004, and went on the shelf, as SciFi channel searched their programming schedule for an appropriate date to begin airing the series. In order to help defray the costs of the production (science fiction television is expensive to make), SciFi had already sold the broadcast rights in the UK to Sky One. Sky One aired the film in the UK early in 2004 – it had done very well for them – and was eager to follow-up with the series, deciding to air the episodes beginning on 18 October 2004. SciFi set their own air date for 14 January 2005.

This isn't an unusual situation; many television programs are international co-productions. PBS and the BBC often share the costs of production, and each has the right to broadcast the program in their own nation. Given that a TV set in America can't receive broadcasts from the UK (not only is the distance too great for a television signal to cover, the signal itself is incompatible, as the US uses the NTSC format for TV broadcasts, while the UK uses the PAL system), there's never been a problem with this sort of division of broadcast territories.

Broadcasters can air programs whenever they deem appropriate, without worrying about what their co-production partners might do in their own countries. So Sky One premiered the *Battlestar Galactica* series without a thought about what this might mean for its American partner.

The stereotype of science fiction fans as unkempt, poorly socialized computer geeks has more than a grain of truth in it. As an audience, the fans of science fiction tend to be early adopters of technology – and that's true around the world. These “geeks” (or “nerds”, if you prefer) often have cutting-edge technologies at their disposal, and they take great pride in showing it off to their geek friends. Over the

past year, one of the most popular must-have items of geek couture is a computer peripheral that allows you to receive TV broadcasts on a PC. This peripheral translates the analog radio waves of the television broadcast into a stream of digital data which can be displayed on the computer's screen. This means that you can watch the television and use the computer at the same time, on the same screen – which makes it a very popular add-on with the geek set. You can shrink the TV screen until it's just a few inches across, and position it in one corner of the display. Or you can make it the desktop “wallpaper” – so that behind everything else on the computer's screen, the TV image goes through its endless animations.

More significantly, these TV tuner peripherals also allow the television broadcast to be recorded to the computer's hard disk. Once the broadcast signal has been converted to a stream of bits, it's a simple matter to write these bits to permanent storage. The recorded program can be played back, right from the hard disk. This gives the computer all of the power of the VCR, without any of the hassle of tapes, which are big and bulky, get dirty, and age poorly. All of these TV tuner peripherals come with software which allows you to program the computer as if it were a VCR; give it a channel, a time, and a duration, and the computer will automatically record any television programming, leaving behind a file on the computer which can be played back later. Computers can access to the internet, something that VCRs don't; this means the TV tuner software can scour websites looking for television schedule information, bringing it up on the computer's display in a gigantic map of available programming. All that you need do is click on a few areas within that map, corresponding to the programs you wish to record, and the computer takes care of the rest. It's so much easier to record a program using the computer than to program a VCR to do the same thing that these peripherals have become enormously popular – millions of them have been sold throughout the world since their introduction.

The video recordings created by these computer peripherals are often stored in a data format known as MPEG-2. (MPEG-2 stands for Motion Picture Experts Group, version 2, the second generation of a standard for the digital representation of moving images and sound.) MPEG-2 is also the format used on DVDs. It is a simple procedure to take the recording made by a TV tuner peripheral and “burn”

it to a DVD. The DVD is a permanent copy of the recording; you can squirrel it away in your own collection of DVDs, you can lend it out, you can even make an infinite number of copies of it. Because these copies are digital, each copy is a perfect reproduction of the original. Unlike analog videotapes, which lose quality with every successive generation of copies, a copy of a copy of a copy of a copy of a DVD is every bit as good as the original. One digital recording can give birth to an endless number of identical reproductions.

MPEG-2 is an old technology, by the standards of 2004. Created in the early 1990s, in conjunction with the standards for DVD, it represented the best practices of the time. But technological development has accelerated greatly in the last fifteen years; the state of the art has moved forward. MPEG-2 is commonplace – millions of DVDs are sold every day – but it's not the best way to store a recorded television signal. MPEG-2 is “fat,” it's clarity comes with a high price – big files. An hour of television, recorded to MPEG-2, takes up about 2 billion bytes (2 gigabytes) of storage on a computer's hard disk. (An hour of film, which has a higher resolution image, can consume up to 4 gigabytes per hour.) That's a lot of space on a hard drive. Most hard drives sold these days average about 80 gigabytes in size, so that means, at most, you'll get 40 hours of television on a hard drive.

In the last few years several technologies have been developed to compete with MPEG-2, and all of them are far more efficient at shrinking a video recording down to a smaller file – with no loss in clarity. Buzzwords such as DivX, Xvid, H.264 and Windows Media 9 Series mean nothing to most people, but to a geek they spell the difference between forty hours of viewing and four hundred. A recording which soaks up 2 gigabytes as an MPEG-2 file, would only use a paltry 350 million bytes (megabytes, or MB) when recorded in DivX. Because DivX is so efficient, it even becomes possible to publish the recording on the Internet, so that your friends can download it.

The one absolute must-have for any self-respecting geek is a fast connection to the Internet. “Broadband” connections, as they are known, are much faster than the first generation “dial-up” connections, which used the phone line to transmit digital

signals. The average dial-up connection runs at around 50,000 bits per second (50 Kbps), while the slowest broadband connections run at least five times faster, and a true geek has a connection that goes as much as twenty times faster, a megabit per second (1 Mbps). At a megabit per second it would take 2800 seconds (45 minutes) to download an hour-long 350 MB television program. Compare that to the three-and-a-half hours it would take to download the corresponding MPEG-2 recording of the same broadcast, and you can see why DivX and its competitors are so attractive to people who want to share their video recordings across the Internet.

Today, nearly the whole planet is wired up through the Internet, and there are millions of TV tuner peripherals connected to computers connected to the Internet. As a result there are a lot of television programs being recorded, and many of these programs are being shared. Widely. The more popular a program is, the more likely it is that will be available for download on the Internet. Which brings us back to *Battlestar Galactica*. The 2003 film had proved so popular that it created an intense demand for the series. The SciFi channel was banking on the rising hype to give them great ratings upon the series premiere. Sky One, recognizing the potential for a hit series (which would attract subscribers to their cable channel) rushed the series onto the air. The premiere episode of *Battlestar Galactica* was promptly recorded and almost immediately available through the Internet to people in the United States who didn't want to wait until SciFi channel chose to air the series. Their audience – the geeks – knew quite well how to find the file, how to download it, how to play it, and how to share it with their friends. Within a few days of the airing of *Battlestar Galactica* in the UK, at least a few hundred thousand people in America had downloaded and viewed the episode. SciFi channel could see their projected ratings falling before their eyes – why would you watch an episode on TV when you'd already seen it?

With the airing of *Battlestar Galactica* on Sky One, an enormous shift in power, which had been going on behind the scenes, finally came entirely into the open.

Broadcasting, as we've known it for the last eighty years (including radio), has been a very efficient way to reach enormous numbers of people. The broadcaster puts up a radio tower, and blasts a signal out; everyone within line-of-sight of the

broadcast tower can receive the signal. The broadcast tower atop the Empire State Building reaches nearly 10 million people, and the one atop Sydney's Centrepont Tower reaches nearly 4 million. Broadcasting is an incredibly powerful resource – but it is also a limited one. Because the radio frequency spectrum must be shared – aircraft, police and fire, military, mobile phones, satellites, all need a slice of it – it is tightly regulated. Only a small portion of the overall spectrum is available for broadcasting. Because of that scarcity, spectrum is incredibly valuable. Radio stations in big-city markets in the United States regularly sell for hundreds of millions of dollars, because of the spectrum “real estate” which comes with the purchase. Just as is said about land, they aren't making any more of it.

Cable television got around some of the restrictions associated with broadcasting; instead of sending signals over the air, they're carried on a wire. The entire bandwidth of the wire can be used to carry television channels – on average, about one hundred channels for analog cable, and about two hundred for the newer digital cable systems (which transmit their digital images in MPEG-2 format). Even so, there are many more cable channels available worldwide than can be carried on any existing cable system. Satellite television broadcasting offers the capability of up to five hundred channels (again, in digital MPEG-2 format), but even this is dwarfed before the number of available channels. New television channels are launched every week; unless they get “picked up” by a critical mass of cable and satellite providers, they soon go out of business.

Broadcasters, cable and satellite providers act as the distributors of television programming. They collect programs (in the case of a broadcaster) or channels (in the case of a cable or satellite provider) and pass these along to the TV audience. In this way, these providers act as “gatekeepers,” picking and choosing the programs and channels which will prove most popular and generate the highest ratings. These providers compete with each other for that most precious of commodities – your attention. Getting you by the eyeballs means they can sell your attention to advertisers. And the advertisers pay the bills. (That's the case for commercial television; with pay television channels such as HBO, the program must be compelling enough to encourage people to pay for subscriptions.) You have access to television programming because of the sufferance of the network, or

cable company or satellite provider. (???) That was the logic of television broadcasting, before 18 October 2004.

Television broadcasters have felt threatened by the Internet ever since the World Wide Web exploded into being in the early 1990s, but not because they'd ever worried that people would be watching TV programs via the Internet. Instead, they worried that people would be too busy reading web sites, answering email and chatting with friends to focus on a TV broadcast. The Internet demands attention, more so than a TV; you can zone out while you're watching the boob tube, but you've got to focus while reading the electronic version of *The New York Times*.

Television ratings have been dropping precipitously since the late 1990s, particularly in the all-important 18 – 24 age group. It seems that the combination of video games, DVDs and Internet have given people so many options for their leisure time that TV viewing has been bumped down on the list of leisure activities. Now, more than ever, hits are vital in television programming – because there are a constantly increasing stream of alternatives to TV. The latest of these alternatives, Internet-delivered TV programs, finds TV competing against itself, in a battle it can never win.

Although people have been using “television over the Internet” since the mid-1990s, both the quality of the images (postage-stamp sized, grainy images which stuttered along, stopping and starting like a worn-out automobile) and the tiny bandwidth of dial-up Internet connections kept it from any mass appeal. As broadband Internet connections became more common, broadcasters could provide a high-quality video stream, delivered through the Internet. That's when the broadcasters discovered something shocking and wonderful about “netcasting” – it costs a lot more money than conventional broadcasting. Consider these economics: if I have a television station, I simply put up a transmission tower, send out a signal, and I let anyone within the reception area watch my broadcast. It costs no more for me to broadcast to one million people than it does to broadcast to a single person – it's the same signal, going out the same tower, all the time. But if I choose to deliver this signal over the Internet, I'll need a computer (a “server,” so named because it “serves” up data to computers – “clients” – which request it) and an

Internet connection to send a signal to someone who wants to receive it. If I want to send a reasonably high-fidelity signal out, I'll need to have about 200,000 bits per second (200 Kbps) of bandwidth. But I'll need it for *every* viewer. If I only have a few viewers, that's not a problem. But if I have audiences that number in the hundreds of thousands or millions, I'll need warehouses full of computers and truly vast Internet connections – as great as any within a research university – to deliver a stream of data to everyone who wants it. In other words, with every viewer I add, netcasting costs me more money.

When the TV industry learned this hard lesson, they believed that they had a more-or-less permanent monopoly on the distribution of television programming. The economics of netcasting meant that broadcasting would always be far more cost efficient. As the gatekeepers of programming, they could decide what would be made, what would be shown, and when it would premiere.

Just as the technology for squeezing television programs into smaller and smaller digital files has been on a constant advance, the technology for distribution of digital files through the Internet has gone through a rapid evolution. In the Internet's earliest days, a communications protocol (protocols are rules by which computers communicate with one another) known as File Transfer Protocol, or FTP, was used to move data from computer to computer. FTP is still very widely used, but it has taken a back seat to other protocols such as HTTP (HyperText Transport Protocol) which is used to transfer the pages of the World Wide Web. Both of these protocols can be used for netcasting, but both of them suffer from problem outlined above – each viewer requires a big slice of bandwidth. Consider any time you've tried to visit a "busy" web site (a good example would be CNN.com on 9/11) – you wait a long time before your web browser loads the web page, because so many other computers are trying to load the same page, and the server can only fulfill so many requests at a time, and can only send so much data through its Internet connection. Because the information is centralized, all requests must be sent to a single server, and all the responses must come from that server. Nothing can bring a web server down faster than hundreds of thousands of near-simultaneous requests for data. This fact is exploited by hackers, who use such tricks in "denial-of-service" attacks, when they flood a server with so many false

requests for data that the server can't address any real requests which might arrive. It doesn't matter whether you're serving up the news, stock quotes, or TV programs; in a centralized distribution strategy – which is essentially an Internet-based version of the classical broadcasting model of a single broadcast tower – popularity is the kiss of death.

In 2002, an unemployed software engineer named Bram Cohen, who had been working with Internet protocols, felt he'd developed an approach which could avoid the price of popularity. In fact, he believed that popularity could be harnessed and used as an advantage, rather than a disadvantage. Over a few weeks in the Autumn of 2002 he built a prototype of his new computer protocol, which he named BitTorrent. BitTorrent differs from FTP or HTTP in that there is no central server, responding to requests from client computers. Instead, all computers which want to get access to some data are considered "peers," meaning all are equal participants in any exchange of data. That data could be a computer program, a video recording, a song, any sort of digital file. When a computer wants to get the data, it logs onto a "tracker" – a special computer program which keeps track of all of the peers. The computer gets the list of peers from the tracker, then starts asking all of the peers to share the data with it. BitTorrent takes a data file being shared and divides it into small segments. Each of these segments can be received from any peer, in any order – because the tracker has also told the computer how to assemble these segments, like puzzle pieces, into the correct order. Best of all, the computer can talk to many peers *simultaneously*. Rather than relying on one peer for the entire file, the computer can get five, or ten, or a hundred peers talking to it, each of them sending a little bit of the file along. Each peer only needs to share a small amount of its data, but, collectively, the computer is getting a lot of information, because it's coming from many, many peers. The more popular a data file is, the more peers there are, and therefore there are more peers for the computer to connect to. With BitTorrent, popularity is a virtue. This means that very popular pieces of data – say, that premiere episode of *Battlestar Galactica* – are shared among thousands of peers just as soon as they are posted to the Internet. And that means it becomes very easy to download these files; they'll download at very high speeds, without overloading any centralized server. Furthermore, if any one peer goes off-line – say someone turns off their computer –

there are still many other peers which can pick up where that one left off. In networking parlance, this is known as “fault tolerance” – meaning that the failure of any one part of the network won’t ruin the network as a whole. (The Internet itself is highly fault tolerant – parts of it fail all the time and you only very rarely notice.)

BitTorrent is an elegant answer for the “superdistribution” of data; it harnesses the millions of Internet-connected computers to create something greater than the sum its parts – a giant, distributed system for the distribution of any type of digital information. That’s what SciFi channel is so worried about. BitTorrent is the death of broadcast television – “peercasting” is more efficient than broadcasting: it’s cheaper, and it has instantaneous global reach. In short, BitTorrent changes everything.

the thrill of it all

Over the 1999 – 2000 academic year I received an appointment as Faculty Master of Annenberg House at the University of Southern California. The building was named after Walter Annenberg, the founder and publisher of *TV Guide* magazine, who had already become a major American philanthropist before he sold his publishing empire to Rupert Murdoch in 1998, for three billion dollars. Two schools in particular – the University of Pennsylvania and the University of Southern California – were showered with Annenberg’s largesse. Each institution received over a hundred million dollars to develop educational programs in media studies. At USC, part of this money went to redesign and refurbish a decaying dormitory, renamed in Annenberg’s honor. To gain a berth in the House, undergraduates had to be concentrating in one of three majors: engineering, communication or media studies. Although many of the communication and media studies students found Annenberg House unappealing, most of the engineering students loved it, because the entire residence had just been wired for very high-speed Internet access. In every suite within Annenberg House, you could plug a computer in and be connected to the Internet at 100 megabits per second – faster, by far, than today’s fastest broadband connections. As Faculty Master, my responsibilities were minimal – I just had to keep an open door to the students (who only rarely came knocking) – but I had a 2000 square-foot apartment, newly and fully furnished, with a study that can only be described as wondrous: enough bookshelf space for all of my thousands of books, comfortable, high-backed armchairs for private conferences with my students, and a network outlet, giving me access to that high-speed Internet service.

USC, along with a few other schools, can rightly claim to be the “birthplace of the Internet,” and even now, some thirty years later, USC has a strong relationship with the various organizations which manage its infrastructure. Many of the engineering students at USC go on to careers as network architects and engineers. All of these engineers-in-training are technically adept, and compete for “geek chic” by being the first to experiment with new technologies. Shortly after I moved into my residence, I had a late-night conversation with two of these engineering

students; they were interested in my own engineering projects, so I told them about my early work on the World Wide Web; eventually the conversation turned, and I asked them what they were using – what had they found interesting? The answer was one word: “Napster.”

“Napster?” I asked. “What’s that?”

“Just go to Napster.com. You’ll see.”

I trotted back to my suite, launched my web browser, typed in the URL, and downloaded the software offered up free on Napster.com. When I installed the Napster software on my computer, it asked me to designate an area of my computer’s hard drive where it could store files, and another area, which would be used to share files. With that, I was up and running. From inside the Napster program I could type any text I wanted – such as the name of a band, the name of an album, or the name of a song – and I’d get a list of “matches,” files whose name which matched the words I had typed in. These files resided on other computers, all across the Internet – I didn’t know where, exactly, only that they were out there, somewhere. If I double-clicked on any of these matches, that file would begin to download to my computer. Some files downloaded slowly – probably because the computer on the other end was connected to the Internet through a dial-up connection. Other files downloaded almost instantaneously, because, between their high-speed broadband connections and my ultra-high-speed 100 Mbps connection, the bits could move very fast indeed.

Written over the first half of 1999 by Northeastern University engineering student Shawn Fanning (whose curly hair tagged him with a nickname which would become the name of his software), in an attempt to improve upon the barely workable techniques of Internet file-sharing, Napster was composed of two separate pieces: the “client” software (running on my own PC), and a “server”, which tracked all of songs available through every computer running Napster. By the time I installed Napster on my computer, in October 1999, there were tens of thousands of computers running the client software; the Napster server was running out of Napster’s new corporate offices in Silicon Valley. (Fanning’s uncle,

recognizing the value of his nephew's intellectual efforts, helped him to incorporate and funded the first stages of the company's development.) Every time anyone launched the Napster software, it would scan the portion of their computer's hard drive which had been designated as "shared" space, make up a list of the available files, sending that along to the Napster server, which added this information to its master list of available files. Then, any time anyone searched for a song, the Napster server would look through that master list, find the matches, and send them back. Once you had the list of matches – these came back with pointers to the computers they resided on – you could download the file directly from the other computer. The Napster server was a clearinghouse; it didn't store the files themselves, only a list of the available files, and pointers to the computers they could be downloaded from.

In the years just before Napster's release, PCs had grown into powerful machines, capable of playing a wide array of digital media. By 1999 nearly all PCs came with a drive which could read CD-ROMs and play audio CDs; audio CDs, introduced in 1983, provided nearly noiseless, digital high-fidelity. CDs proved so popular that the recording industry reaped windfall profits in the late 1980s and early 1990s as people converted their collections of vinyl albums to the smaller and more durable CD. The CD was a very high-technology item at its introduction; twenty years later it seemed almost antique. An audio CD can hold a fair amount of data – about 700 million bytes (700 megabytes), which translates into 72 minutes of music. (The storage capacity of a CD, determined by a Sony researchers, was set to the average length of a recording of Beethoven's 9th Symphony.) An audio CD holds all of digital information in a "raw" format – the bits on the CD are a perfect copy of the ones which have been mastered in the recording studio.

In the 20 years since the introduction of the CD a number mathematical techniques have been developed to "compress" raw music data into much smaller files. The most popular of these compression techniques is MP3 (MPEG-1, Layer 3, for Motion Picture Experts Group, version 1, Layer 3 Audio). MP3 recording uses a mathematical technique known as Fourier Transforms to break an audio signal into its constituent sound waves. It's like a chord played on a guitar: you can think of a chord as a set of individual strings being played simultaneously. In the same way,

MP3 takes digitized music and breaks it into the simple tones from which it is composed. That process of analysis and simplification makes MP3 an efficient way to store music digitally. Back in the early 1980s, computers weren't powerful enough to handle a conversion from MP3 format back into an audio signal. By 1999, they were more than fast enough. You could pop an audio CD into your computer and "rip" it – translating each of its hefty digital "tracks" into much smaller MP3 files. Using MP3 you could easily convert a 700 MB CD into a 35 MB MP3 file. That 20:1 savings in file size made it possible to transmit songs across the Internet in a reasonable amount of time, even over slow dial-up connections. So, by 1999 there were a lot of MP3 files on Internet-connected computers, but there was no way to find where these files were. Until Napster. Suddenly I had access to a global database of all of the MP3 files of every Napster user. When I first logged into Napster, the total count of available MP3 files stood at over half a million.

It is difficult to describe the feeling of joy that accompanied my discovery of Napster. There are certain technologies – such as the Web itself, or Google, or Friendster (which I will discuss in the second section of this book) – which are just so alluring, so seductive, they suck you right in. I know that when I "got it," when I understood what Napster brought to me, I started vibrating with ecstasy. I had a lot of music in my personal collection – at least 300 CDs, collected over the previous 15 years – but even so, there were a lot of songs I wanted, but I didn't have. If they were available on Napster, they soon ended up on my hard drive. Because I had a very high-speed connection to the Internet, many of these songs took no time at all to transfer. Within a week's time I had 500 new songs on my hard drive – songs that I'd always wanted to own, songs that I'd always loved. I offered up these songs to be shared, and, through Napster, people downloaded these songs from my hard drive. Share and share alike. I even ripped several albums from my personal CD collection, putting them in the shared area of my hard drive, precisely because I couldn't find them anywhere on Napster. It wasn't enough to share what was already out there – it was important to add to the overall selection. Napster excelled at popular music – if a song was popular you'd find countless versions of it available for download. But if something was more obscure you might find only a single copy of it – or it might not be out there at all. This

popularity contest is a natural feature of file-sharing networks; as something becomes more popular it becomes more available from more sources.

Although I was a relatively early user of Napster, much of the rest of the world soon caught on, beginning with America's university students. By the end of 1999, many American universities had, like USC, provided their students with high-speed connections to the Internet, seeing this as essential for learning. Napster spread like wildfire across college campuses, and the number of available MP3 files grew, smashing through one million, then two, then four and eight million. By the time America's college students had returned from their Winter recess, you could search through a list of ten million MP3 files. While much of this music was simply duplicates of the same few hundred hit songs (Eminem, Metallica, Pink Floyd, etc.), as the collection grew it also grew in diversity. Friends reported that they found recordings of songs they'd sought for years. One friend built up a collection of Tin Pan Alley recordings, another a collection of French-Moroccan "rai" music. As more people used Napster, the collection grew; as it offered something for everyone, it became ever more alluring. It was thrilling: I could foresee a day when every recording ever made by anyone, anywhere, would be available through Napster.

Of course, it was too good to last.

In December 1999, sensing an impending disaster, the Recording Industry Association of America (RIAA) filed suit against Napster in a California court, claiming that the company was profiting from wholesale copyright violation. It is illegal, under US copyright law, to deal in materials under copyright without the permission of the copyright holder, and the RIAA argued in its legal filings that Napster was doing exactly that. Not so, replied Napster: we don't store any of these files, we don't provide them to the users of Napster. Napster argued that its users shared these song files with each other – something that is legal under US copyright law. While Napster acted as a clearinghouse for these files, it insisted that this, in itself, was not illegal under US copyright law. A court date was set, and lawyers prepared for the first legal showdown of the era of digital distribution: the RIAA vs. Napster. Meanwhile, the publicity generated by the lawsuit brought

Napster even more users. Over the opening months of 2000, tens of millions of songs were regularly available through the service.

Napster reached a peak of 13.6 million users in February 2001. By that time perhaps as many as a *quarter billion* MP3 tracks were available through the service. Big name musicians like Madonna and Metallica filed suit against Napster – but Metallica took a beating for doing this, because their fans were more likely than most to be avid Napster users. Napster translated the world of recorded music into a gigantic disk drive – turning the business of recorded music upside down. And, although Napster might not have been directly responsible for massive copyright violation, it wasn't hard to convince a judge that Napster provided the tools to make these violations possible – and that *is* an illegal act. It took eighteen months for the RIAA to triumph in the California courts; in July 2001 a judge ordered Napster's server be shut down. In the hours before the order took effect at least 14 million file transfers were recorded. Then, as Napster went down, the wholesale file-sharing of the universe of recorded music apparently ceased.

If only things were that simple.

“Disruptive” technologies such as the World Wide Web or Napster are often incredibly seductive to their users. Once you've become accustomed to the World Wide Web, it begins to become difficult to imagine a world without it. It becomes incorporated into your thinking and behavior. If the Web suddenly went away, millions of us would suffer through a very painful change of mind. It's not as though we're “addicted” to these technologies; rather, we have incorporated them into our understanding of how the world works – we expect the Web to be there, much as we expect electricity or hot water in our homes. Napster was one of the most seductive technologies ever created, and its absence created quite a vacuum – a vacuum that was quickly filled.

Just three months after the RIAA sued Napster, Justin Frankel and Tom Pepper, two software engineers at Nullsoft, a tiny division of media giant AOLTimeWarner, posted an announcement to Slashdot, a website popular with the geek crowd. (Slashdot's tagline is “News for nerds. Stuff that matters.”) The

announcement proclaimed the release of a new piece of software, “Gnutella,” which could be used to create file-sharing networks between Internet-connected computers. Gnutella, they declared, differed from Napster in one very substantial feature: with Gnutella there is no centralized server, keeping a master list of all the files available on all the computers connected to the file-sharing network. Instead, the computers treat each other as peers (as is the case with BitTorrent), and use a process of discovery to find out what’s on other computers in the file-sharing network. My computer might send out a request for a song by ambient legend Brian Eno; in a Napster file-sharing network the server would take a look for all the songs by Brian Eno in its master list, then send back a list of matches. Within a Gnutella network, I send that request to the two or three other computers I am connected directly to; if any of these have matching files, they’ll tell my computer. They’ll also forward the request to another two or three computers they’re connected to. My request is forwarded again and again, slowly working its way across the large network of computers running the Gnutella software. It takes much longer for me to get an answer to my request, because the request has to be passed on to many thousands of computers, all over the Internet. Gnutella is less efficient than Napster, but, because there’s no centralized server (every computer on a Gnutella file-sharing network acts as both a server and a client) there’s no single point that can be shut down. Or sued out of existence.

Gnutella is a technical fix to the problem that plagued Napster: the RIAA. When the RIAA sued Napster, in December 2000, network engineers like Frankel and Pepper gave thought to the legal issues raised by file sharing. Consider: If it is illegal for a commercial organization like Napster to promote theft of copyright, but it is legal for you to share your music with your friends, can you design a network that allows you to share things with your friends without getting a commercial entity involved? At its essence, that’s what Gnutella is. It’s a file-sharing network with no center, just a loosely-affiliated network of peers (your friends), all of whom want to share music with one another.

Gnutella isn’t perfect; beyond a certain number of connected computers it won’t perform as well as Napster. But it is invisible, subterranean in a way that Napster could never be – making it all the more vexatious to the RIAA, and, more

significantly, to the parent company of Nullsoft. Back in the mid-1990s, Nullsoft released Winamp, a very popular piece of software used to play CDs and MP3 files on PCs. AOL bought Nullsoft in 1999, fleshing out their portfolio of media software – but, in January 2000, at the height of the dot-com boom, AOL announced its merger TimeWarner. It was thought by many that the flagship online service provider and a media giant was a perfect marriage of new and old media. TimeWarner owned Warner Music, one of the largest companies in the record industry. This meant that AOL now had a substantial investment in copyrights. And one of its divisions had just released a tool which would aid in the theft of copyright.

It took AOL less than 24 hours to shut down the distribution of the Gnutella software; but, because of the announcement on Slashdot, hundreds of thousands of geeks had already downloaded and installed the software. I was one of them. In the earliest hours of the Gnutella network, you could actually watch the search requests as they passed through your computer. This was a unique experience – almost like having a window on the Internet. Many of the searches were for pornography – what else can be expected of a network populated principally by college-age men? But many other searches were for subjects far more obscure and interesting. The earliest version of Gnutella was almost like having a stock ticker on the collective mind of the Internet. What’s interesting? What’s important? What’s fun? All of that flashed by, several times a second, on my computer screen.

Despite the shutdown of the distribution of the Gnutella software (or, perhaps, because of it) many geeks took a good look at how Gnutella used the Internet to create its self-organizing file-sharing network. These observations were published – again on Slashdot – and lots of programmers around the world began to write their own versions of Gnutella, making a continuous series of improvements to the program originally developed by Frankel and Pepper. In short, all that Nullsoft had to do was to prove that it could be done. The rest took care of itself. When an idea as seductive as file-sharing comes along, people will line up to work on it, eager to help in the collective project to make it easier and easier to get to more and more information.

By the time the courts pulled the plug on Napster, most of the core community of file-sharing enthusiasts had already transitioned to Gnutella. It didn't make any difference to any of them that Napster had gone dark; they had, through their own efforts, built their own file-sharing network. That network continues to grow to this day. The RIAA has lately taken to suing individuals who participate in file-sharing, believing that striking fear into the hearts of those who illegally trade in music is the best strategy toward keeping the practice to a minimum. But it is impossible for the RIAA to gain the upper hand; the decentralized, distributed nature of Gnutella makes it practically impervious to attack. All the RIAA can do is file lawsuits against the most egregious violators of copyright. This strategy has occasionally backfired, as in the case of a 68 year-old grandmother, who found herself on the wrong end of a subpoena. (She didn't even own a computer.) The RIAA is also flooding the file-sharing networks with "bogus" versions of popular songs, hoping to make file-sharing more work, and more dangerous, than it's worth. But these attempts are all just so many fingers plugging holes in a dike that's being undermined by the built-up pressure of such a seductive technology.

The RIAA is engaged in a losing race; doing everything it can to shut down the file sharing networks, it is also applying the kind of pressure that forces a technological evolution. In this, the RIAA's attempts echo the development of the Internet. Thirty years ago the Internet was very simple, and not very stable. As it grew, and more pressures were introduced, the protocols which create the Internet were modified to reflect the lessons learned along the way. Today, we have a highly reliable global Internet, because the pressures of the past have been incorporated into its design. When the RIAA attacks file sharing, they provide the pressure which forces these file sharing networks to evolve into forms which become increasingly invisible, increasingly pervasive, and ever harder to root out. The proof is as simple as this: although no one knows for sure, it is believed that many, many more songs are shared today than in Napster's heyday. Far from being the enemy of file sharing, the RIAA has been its best, most loyal friend.

you can't download a tee shirt

At a post-Christmas barbecue, one of the kind Australians continuously throw during their high Summer season, I met a musician named Peter Neville. “What do you play?” I asked.

“I started with the violin,” he replied, “but now I play drums. Percussion.”

“Do you play with a band?”

“Yeah. The Resindogs. Out of Brisbane.”

“Wow. Made records?”

“Yeah, a couple.”

“Cool! You have a record contract?”

“Well...we did.”

“Huh?”

“Our first album did really well, sold about 25,000 copies. But the second one, that sold only 12,000. Funny thing is, our concerts were drawing bigger crowds all the time. When the second album came out, we were more popular than ever before. But we couldn't sell the records – so our label dropped us. They only have time for you if you're going to be a huge hit. If you're a smaller act, they just drop you. We only ever got play on JJJ (Australia's “alternative” FM radio station), never on the big pop stations. No airplay, no record sales.”

“I don't get it; if you were more popular, why'd you sell less albums?”

“Why do you think?” he concluded, giving me a hard look. He knew I was playing dumb.

We’ve now come to the hard place, where art and commerce meet, where desire and duty battle it out. The Resindogs second album, which could have been a chartbuster, failed commercially because the band’s fans simply downloaded the music from the Internet. These fans didn’t pay royalties to the copyright holder (in this case, Virgin/EMI music, one of the “big four” recording companies), so there was no money to pay Peter for his own work.

There’s a widely-held opinion, born of willful ignorance, that file-sharing doesn’t hurt anybody except greedy record executives (who probably deserve it). The RIAA works to “educate” the public about the economic evils of file-sharing: not only is it against the law, it deprives your favorite artists of money they’ve rightfully earned. But, because this message is coming from an organization widely perceived as evil, corrupt, and greedy, the message dies with the messenger. Screw the RIAA, the logic goes, they’re suing grandmothers. With this shaky moral justification, the recording industry is rapidly being hollowed out. Although 2004 will likely be the best year in history for the industry, in terms of sales, everyone knows that several billions of dollars in copyright theft have deprived the industry of even higher revenues. These billions might be a drop in the bucket for big acts like U2 or Metallica, but it’s a make-or-break affair for 2nd tier bands like the Resindogs. And, as the lesser acts are dropped by the record companies, those companies are forced to focus upon fewer and fewer big releases. That means the record companies have become progressively more vulnerable to file-sharing. If you’re only putting out twenty or thirty “big” albums every year, and you’re banking on every one of them being a hit, file sharing becomes a very real threat. You’ll throw a lot of marketing dollars behind each of these releases, spread the hype, and find, one day after the release, ten times as many of people downloaded the album illegally than purchased it in a record store. That’s the way of the world today, and there’s no sign that it will change. There’s no sign that it *can* change.

We’re confronted with quite a paradox: file-sharing satisfies our desire to have access to vast and varied collections of music, but file-sharing so pollutes the

economic ecology of recorded music as to render it a toxic monoculture, populated only by the most popular (and, often, most puerile) content. If we were satisfied with what has already been recorded – the last hundred and twenty five years, since Edison’s invention of the gramophone – we could let file-sharing spread far and wide, and simply recycle the history of recordings endlessly. But I suspect that would soon grow dull. Although we should treasure our musical heritage, it’s also important to be confronted with new artists and new music. Without that constant breath of fresh air, our musical culture would quickly grow stagnant. We have to find a way to live with file-sharing; it’s not going to go away, yet it threatens the very medium it celebrates.

I don’t have any easy answers for this paradox. I suspect there aren’t any. But, eternally hopeful, I asked musician Peter what he thought he could do to earn a living as a musician in the age of file-sharing.

“Well,” he replied, “you can’t download a tee shirt.”

With his hard-earned wisdom, Peter put his finger on the very heart of the matter, the difference between atoms and bits. The ones and zeroes of the digital universe are infinitely reproducible at little or no cost; you don’t have that kind of liberty in the material world – you can’t just wave a magic wand and reproduce a thousand tee shirts emblazoned with your favorite band’s emblem. Whether or not we consciously recognize the distinction between atoms and bits, as a culture we have already incorporated this difference into our assessment of the value of digital media. It is said by some enthusiasts of file sharing that it isn’t really theft. If I make a copy of your CD, you still have the original. You’ve lost nothing, yet I’ve gained something. If you haven’t lost anything, how can it possibly be a crime?

Three hundred years of copyright law say otherwise. First enshrined in the British legal canon in the early 1700s, copyright law provided a mechanism whereby the authors of books could profit from their efforts. In earlier times, popular books were simply duplicated and sold by competing publishers, without any recompense to the creator of the work. Authors of hugely popular books died in poverty. Copyright guaranteed that an author could assert complete economic control of his

work, holding it closely or releasing it for sale as appropriate. It's a noble idea, one which was later enshrined in the US Constitution. (The US Patent and Trademark Office, which also handles copyrights, was established in 1790, immediately after the ratification of the Constitution.) Because of copyright, the publishing industry could build a sustainable economic model. As a result, today we have millions of texts available to us, the product of those three centuries of copyright law.

Copyright in itself is not an evil; it lets us have ownership over our own ideas. But the copyright practices of all of the media industries – music, film, television and print publishing – have lost touch with economic reality.

One of the continuous obsessions of economists is the idea of “value” – of what something is worth. This is a tricky subject, because it is so subjective. Some things which have enormous value to you (a photograph, or a yellowed letter from a long-dead relative) might have no value at all to me. Other things, such as gold or diamonds, have value because of their “inherent” qualities. Gold and diamonds are valuable because of their scarcity (gold is truly rare, while diamonds are kept in a permanent state of artificial scarcity because of the DeBeers cartel), and because of their material characteristics: gold is the best conductor of electricity, diamond the hardest substance known. Every material object has both some absolute material value and some subjective worth; the human body is composed of a few dollars of carbon, water, and minerals, but we consider human life beyond any economic calculation. Karl Marx defined the economic theory of “Surplus Value” – in his model, the Earth's raw materials have only minimal value until human labor has transformed them into usable commodities. (Think about how much it costs to pump a gallon of crude oil from the ground – a few tenths of a penny – when measured against the price of a gallon of refined gasoline. That's surplus value.) The value of cotton in the fields is far less than the value of the same cotton, spun into a tee shirt. Human activities upon the material world add surplus value to it.

What is the value of a song? What about a film? Neither a song on a CD, or a film on a DVD, is really a material thing. Yes, the physical material of the disc costs about ten cents for a CD, and about 20 cents for a DVD, and it may cost another penny or two of labor to “burn” the digital information to the disc. But CDs rarely sell for less than ten dollars, and DVDs rarely retail for less than twenty –

particularly if they're popular titles. The costs, we are told, are production costs: it costs upwards of seventy million dollars to produce the average Hollywood film; it costs many hundreds of thousands of dollars in studio time to create an album. In addition, it costs money to promote the film or album, to raise public awareness of the existence of the work – in other words, it costs money to generate demand for the work, demand which increases the value of the work by making it more desirable. The price you pay for a CD or DVD is essentially the price of desire; if that price is greater than your desire, you won't buy it. On the other hand, if it's something so alluring that you simply must have it, you'll pay almost any price for it. Marketers think very carefully about where to set the "price point" for these sorts of intangible goods, looking for a balance between perceived value (desire) and sale price. The price must cover production costs, but everything beyond that is the price you'll pay to satisfy your own desire.

File-sharing has eliminated the cost of satisfying our desires. The personal acquisition of media, once strictly rationed because of the value assigned to it by copyright holders, has become unshackled from the economics of scarcity. A copyright holder no longer has the capacity to act as a "gatekeeper" to the digital properties they control. These properties can now be copied perfectly, endlessly, and at no cost. The more popular a property is, the more likely it is that there will be digital copies being traded through file-sharing networks. Material objects like vinyl record albums and films exhibited in theatres (shown on celluloid, though this too is transitioning to digital) are difficult to copy as material objects, though they can be digitized. Everything that can be easily translated into a digital form – music, movies, television programs and books – is slipping beyond the control of copyright holders.

If ubiquity through superdistribution on file-sharing networks is the natural state of digital media – I believe that I have adequately demonstrated this point – then it is up to the holders of copyright to adapt to the new economic realities of digital distribution. The world will not change to suit the economic needs of the recording industry or movie studios; no amount of legal haggling, political influence buying, or threats of artistic apocalypse will slow the trend toward the ever-greater distribution of digital media. These works will be copied and recopied because

people desire the experiences which they articulate, and because the essential nature of the digital medium makes it so easy to satisfy that desire. How, then, can artists adapt to this new world, where economic models, developed over the entire Industrial Era, have ceased to function?

The solution is simple: embrace piracy.

This sounds like a ridiculous statement: how can you embrace piracy and earn a living? After all, if you just give your work away, it won't have any value. People won't pay money for something they can get for free. That, at least, is the common-sense reasoning. It is also wrong.

Movies and music are not the only forms of digital media. Computer software is inherently a digital medium, and software companies have been plagued with digital piracy since the earliest days of personal computing. Most commercial software released today comes with a "key," a string of numbers and letters which must be typed into the software during its installation. But, just as fast as a key gets generated, someone shares it – after all, it's only a bit of text – and then any number of people can install the same piece of software. Commercial organizations very carefully ensure that their software is all properly licensed and paid for, but home users rarely observe such niceties. Software piracy is rampant, and always has been. Yet the software industry is larger than it ever was, and growing furiously.

Rock musicians use a lot of software to compose and mix music, and Peter has some on his Macintosh. "I downloaded a cracked version of this composing software," he said, meaning that the protections on the software to prevent unauthorized use had been removed, "but I discovered that as I learned the software, I really wanted to have a legal copy of it, so I could get updates and support and all the newest features. I used the free copy, only to learn that I wanted a real copy." Peter paid the thousand dollars for a licensed version of the software, and doesn't regret it. The accessibility of digital media leaves us free to experiment, to learn what we like and don't like, and to invest ourselves in the

things which really capture our interest – even to the point of spending a lot of money on them.

For my own part, my ability to download music that I've heard through friends or on the radio has introduced me to artists I would have missed otherwise: bands like Wilco and Gomez, musicians like the late Elliott Smith – all of these performers I first heard through tracks I found on file-sharing networks. Only later did I become an avid fan of their works, buying many of their albums. It's isn't as though a CD has no value at all. A CD has enormous value to a fan of a band; it's a physical representation of attachment, a statement of loyalty, something that separates a connoisseur from a poseur. We each have our passions, and we invest our time and money and attention in them. In order to demonstrate these passions we collect material things, badges signifying membership in a community of fans.

The recording industry isn't blind to this sort of behavior; back in they heyday of vinyl they offered "digitally remastered" recordings of classic albums, complete with special covers, photos, bumper stickers, and so forth. Recently, both record companies and film studios have been releasing "special edition" versions of their media properties. A special edition CD might have a few extra songs, or a DVD of a live concert by the band, while a film DVD might have hours of extra footage, director commentaries, a behind-the-scenes documentary, and so forth. These special editions sell for as much as three times the "standard" version of the media products, because they've been designed to be intensely desirable to a loyal fan base. A loyal fan will collect *every* version of a property – look at the number of versions of *The Lord of the Rings* DVDs that have been sold: standard edition, widescreen edition, extended edition – all of them eagerly snapped up by a hungry horde of fans. There is always room in the market to sell something to someone – even when it is given away freely.

Here's where file-sharing demonstrates its positive capability in the marketplace. In a world where all digital media is freely available, *the more something is shared, the more valuable it becomes*. This seems counter-intuitive when viewed through the obsolesced economic model of copyright, but fits in perfectly with the new era of digital distribution. The best example of this phenomenon comes, once again, from

the world of software. LINUX is a computer operating system which draws its design fundamentals from an operating system known as UNIX, created at Bell Labs back in the early 1970s. Bell Labs made UNIX freely available to universities around the world, so an entire generation of computer scientists and engineers grew up familiar with it. As a result, UNIX gained enormous popularity with the geek set from its very early years. In 1991 a Finnish engineering student, Linus Torvalds, decided to create his own version of the UNIX operating system for his own PC. Rather than trying to sell his program – which he named LINUX, a play on his first name – he decided to share his work freely over the Internet, asking other programmers to contribute to the effort to improve his admittedly meager efforts. Over a decade, LINUX grew from a one-man project to a participatory effort by thousands of engineers working around the world. Their collective efforts led to the development of a stable, robust and very powerful operating system – an operating system so popular that most web sites on the Internet use some version of LINUX to run their web servers, and so successful that Microsoft sees LINUX as the greatest threat to their continued dominance in computer operating systems.

LINUX is still free – it always has been, and very likely always will be. But that hasn't stopped anyone from making billions of dollars with it. IBM, that colossus of computing, began investing in LINUX in the mid-1990s, and today sells software packages for LINUX which cost hundreds of thousands of dollars. Some of this software is proprietary – the copyright is owned by IBM – but much of it is freely available through other sources. Companies pay IBM money so that IBM will support the software. IBM will answer the phone when something goes wrong, and that's worth real money, even if the software itself is free. IBM isn't the only company profiting from free software: RedHat, Novell, MySQL, and scores of other firms and individuals make substantial earnings providing support for software freely available for download from their web sites. None of this would have come to pass if Linus Torvalds had held onto his intellectual property. Sharing his work has made him a geek celebrity with worldwide fame, a good job, and a comfortable life doing what he likes best – furthering the development of LINUX. Torvalds may be the most famous member of this club, but he's hardly the only one. Many others have found that sharing their work is the best path to success. I am one of them.

In 1994 I completed work on a project to wed the then-new World Wide Web with my own work in real-time 3D computer graphics. When I'd finished my programming, I was faced with a choice: I could try to hold it under copyright, and struggle to find customers and investors, or I could release it freely, lose control over my work, and do my best to interest others in it. Although I have profited little directly from my work (known as Virtual Reality Modeling Language, or VRML), as my work grew more popular I was offered a book contract. Over the next four years I wrote three books about VRML. One of these books did well enough that I didn't have to work for a whole year – giving me the freedom to continue to promote VRML. Writing led to an invitation to teach at San Francisco State University, which led to my appointment at the University of Southern California, and, finally, to my current position as Lecturer at the Australian Film Television and Radio School, Australia's national film school. I am where I am today – doing what I love – because of the reputation I earned by giving my own work away.

Is it any easier to compose great music than to write a great piece of software? Music is an art and a craft; it takes years of practice to master it. Yet it is probably not necessary to participate in the existing economic system of recorded music to have a successful career as a musician. Peter earns money from live performances with the Resindogs, and even if these earnings will never equal the returns of a chartbusting album, they're enough for him to live comfortably upon. The Resindogs website has a list of band paraphernalia – including tee shirts – which fans can purchase, and that money also flows back to the band. If the Resindogs take the final step, and freely release their music into the file-sharing networks, there's some chance that they'll find audiences outside of Australia – in America or the UK, or perhaps even Japan. They might find that the global reach of superdistribution gives them a popularity they never had when they worked under contract for Virgin/EMI. A global base of music fans could promote them far beyond the limited resources any record company would care to devote. It could happen. This story could have a happy ending. But it will take a change of mind before the Resindogs can even begin to consider the possibilities. For now, most professional musicians pin their hopes on cutting a huge record deal and getting

millions in royalties. But such instances have always been rare – and now, in the age of file-sharing, they're growing rarer still.

So we come to this book. You might be reading this book in the traditional way – as a hardcover or paperback purchased at a local bookstore, or borrowed from a friend. Or, you might be reading this book online. Before I started writing *hyperpeople* I made a decision to release the text freely through the hyperpeople.org website. I'm putting my money where my mouth is. Literally. I do understand that popularity is the best thing that could happen to my work, and that the best path to popularity is to share this work freely. If people like it, they'll tell their friends, who will tell their friends, and so on. Some might like it enough that they'll want to own a physical copy – because a book in hand is nearly always better than a book on screen. (That's one advantage that publishing has over the recording or film industries – for the moment.)

It remains to be seen whether any book publisher understands this logic. A publisher may feel that a book freely available in electronic form has no value in print. They couldn't be more wrong, but until publishers are confronted with a commanding economic argument – arguments I have attempted to provide here – they'll go about their business in the same old-fashioned way, missing out on an opportunity which, if properly leveraged, could make them even more money. If you're reading a book made of atoms, not bits, it means that somebody, somewhere, understands. My publisher will have learned how to put superdistribution to work. Here's hoping.

the doors of reception

When I arrived in Australia in October 2003, I brought a gigantic suitcase stuffed with clothing and computers. Everything else I owned – my books, furniture, kitchenware, geek gear, everything that I'd collected in twenty years of adult life – I distributed among family members or locked away into long-term storage. Moving halfway around the world meant I'd have to start the game of material acquisition all over again. Some friends in Sydney took pity on me, loaning me a beaten-up couch and dented coffee table, so at least I'd have somewhere to sit, and somewhere to support my iBook. I took care of the priorities first: a bed, some basic kitchenware, a high-speed Internet connection. This last was more necessary than might first appear; that Internet connection became my lifeline to the country I'd left behind. I could email my friends and family and complain about my homesickness, or extol the virtues of Sydney's Summer weather, or just gossip. I could maintain my connection to my community of origin. That's a common element in the experience of every immigrant, to every land.

With the basics sorted, it came time to look toward another, less essential, but still important possession: a TV set. To fully participate in a modern nation's life – particularly when you're teaching at a school which trains television producers – you need to invest yourself in its electronic culture, and broadcast television is both the most visible and most influential of these cultural elements. Intellectuals often treat television as beneath contempt, a device which only hypnotizes the mass mind into a somnambulist simlucrum of life. I've never shared these feelings, perhaps because I grew up in a "golden age" of television, when such archetypal programs as "The Brady Bunch," "All in the Family" and "The Mary Tyler Moore Show" all graced America's television screens. Television, like any other art form, is a matter of taste. You needn't like all of it, but it is important to know what you like. Everyone has their guilty pleasures, the sinful indulgences of "Jerry Springer" or "Doctor Phil," and there are near-universal favorites, shows like "The Simpsons". There are also those few, rare programs which so transform the television experience that they lead you to redefine your expectations. For me, one of those programs is the HBO series "Six Feet Under." Although "Six Feet Under" is

shown on a subscription cable channel in the United States, in Australia it airs on Nine Network, a commercial television station. I needed a television to watch “Six Feet Under,” and that alone was reason enough to purchase a set.

Across the world, television broadcasters are entering the digital era; they’re moving from the transmission of low-resolution analog signals to high-resolution Digital Television (DTV) broadcasting. DTV comes in two flavors: standard-definition broadcasting (SDTV), which gives you DVD-quality picture and sound; and high-definition broadcasting (HDTV), which provides an image which is very nearly the same resolution as a film shown in a theatre, with the same Dolby surround sound. The difference between an analog television broadcast and an HDTV broadcast is remarkable; the eye wanders, mesmerized, absorbing the detail revealed in the image, trying to drink it all in. HDTV is the future of television broadcasting, and (so my internal logic ran) I needed to have an HDTV set, so I could be a competent teacher. One problem presented itself: HDTV sets are still very expensive. Because they present images in great detail, the HDTV screen is a very high-technology item, hard to manufacture, and produced in relatively low volumes. A large-screen HDTV set costs at least \$4000 in Australia – far more than I could hope to afford. What to do?

As I researched my options, I discovered that I could, for just \$300, purchase a peripheral for my PC which would turn my PC into an HDTV receiver. This DTV tuner card is similar in nature to the analog TV tuner cards which have been going into PCs for the last five years; this one had the electronics necessary to receive digital broadcasts, and would use the PC’s microprocessor to convert the digital signal into an image that could be displayed on my computer’s screen. It wouldn’t be the full 42-inch glory of a \$4000 HDTV set, but it would be more than adequate – and I could afford it! I ordered the device, popped it into my computer, and installed the accompanying software. That software gave me the capability to tune into any of Australia’s five digital television broadcasters, several digital radio stations, and a number of “datacasting” channels, which provide still images of the weather, or stock market information, or news reports from the Australian parliament. As is the case with analog TV tuner peripherals, I could record broadcasts to the hard drive of my computer. The SDTV signal, which is the

standard for most Australian broadcasts (only a minority of programs are broadcast in HDTV, either in Australia or America), is almost exactly the same as the MPEG-2 format used to store films on DVDs. In other words, I could record an SDTV broadcast off the air, and immediately burn it to a DVD. I'd have a perfect copy of the broadcast, bit for bit. That recording would be indistinguishable from a commercial DVD copy of the same TV program – the bits would be exactly the same. I recorded programs for my Sydney friends – programs they'd missed when they went to broadcast – and gave them DVDs they could play in their living rooms. I started recording so many programs that I had to buy another hard drive for my computer. It quickly filled up, so I took those recordings and burned them to DVDs. My drive filled up again. I became a television collector, something I'd never been when I owned a VCR. It was so easy to record a program and burn it to a DVD that anything which caught my fancy – a drama, documentary or news program – went onto my hard disk, and later onto a DVD.

My PC is attached to the Internet, as are all the computers in my home. I have a fairly broad selection of software on that computer, although I rarely use any of it, because that PC is doing full-time duty as my television set. But one particular piece of software, known as Apache, is always running on that computer – indeed, Apache is always running on *all* of my computers. Apache, like LINUX, is an “open source” software program, created by the collective efforts of thousands of engineers working around the world. Apache also happens to be the software which runs most of the web servers on the Internet – nearly 70% of them, as of this writing. Apache transforms nearly any computer into a web server. A fairly sophisticated piece of software, Apache is not terrifically easy to set up, but I've been using versions of it since it was first released, back in 1995, so I'm quite familiar with how to make it do my bidding. After I installed the DTV tuner on my PC, I configured Apache to make the new disk drive, where I stored all of my TV recordings, visible on the Internet. Anyone, anywhere on the Internet, could now type in a URL and have access to the TV recordings I'd made. I did this just so I could get to my TV programs, but the full implications of what I'd done struck me a few days later: I'd become a digital television broadcaster.

If bits are bits, it matters not at all whether those bits come through the airwaves – as in the case with DTV broadcasting – or from my hard drive, through my web server. They’re the same bits. And while I can’t reach an audience of millions with my PC – it would overload my Internet connection – I can provide television programming for a few. This is hobbyist DTV, television broadcasting for the masses, because it’s broadcasting *by* the masses. Although I had to jump through a few technical hoops to get it all working perfectly, that isn’t really necessary. There are a number of commercial software packages which do everything that I had to do by hand, but do it automatically. Anyone with an Internet connection can become a DTV broadcaster. You don’t even need a TV tuner card, if you have another source for your recorded TV programs – a source such as BitTorrent.

Although Nine Network in Australia airs “Six Feet Under,” there’s a delay of several weeks between the premiere of an episode on HBO in the United States and the premiere of the same episode in Australia. When the fourth season of “Six Feet Under” began to air in the US, I got email from my friends in America – fans of the series – asking, “Did you see last night’s episode? Wasn’t it amazing?” I could only reply that I was at the whim of Australia’s television programmers, and I had to wait until they saw fit to begin airing the series. A few weeks later, I got a terse email from a close friend which said simply, “Tonight’s episode of SFU was the best thing I’ve ever seen on television. Find it. Watch it. Now.” The search for that episode – the fifth of the fourth season – led me to my discovery of BitTorrent. Within a few days I had learned that nearly every TV program, aired anywhere in the world, was available on BitTorrent. I quickly downloaded the first five episodes of “Six Feet Under” (my friend was right, that episode was incredibly compelling viewing), and, as new episodes premiered on HBO, I picked them up off BitTorrent. I was keeping up with my friends in America, able to email them about the best dialogue in each episode, commenting on character arcs and story twists, just as if I’d been watching beside them on the sofa. By the time the series premiered in Australia, I’d already seen the first eight episodes of the season, and didn’t bother to tune in. After all, I already had those episodes on my hard drive; I could watch them any time I wanted to. What’s more, these episodes were available through my web site, so if any of my Australian friends missed an episode,

I could sit them in front of a computer, click a few times with the mouse, and invite them to sit back and enjoy the show.

Although Nine Network wouldn't have seen a perceptible drop in their TV ratings, they'd lost at least one viewer – myself – because of BitTorrent. I used BitTorrent to free myself from the tyranny of the broadcaster, who buys the programs, sets the schedule, and earns money from the advertising sold into the program. This power relationship which the broadcaster holds over the TV audience is particularly noticeable in Australia, because, for reasons that no one has ever adequately explained, television schedules here are, at best, rough approximations of reality. Programs advertised to start at 9:30 might start twenty or thirty minutes later. That fact makes it nearly impossible to record a program to a VCR – or a computer equipped with a TV tuner – because you never know when to start recording, or when to stop. Australians frequently complain about how a recording managed to miss the last, pivotal minutes of a television program, because of this scheduling anarchy. If you're not there, glued to the TV set, waiting for a program to air, you're out of luck. And, because television broadcasters have been the gatekeepers of television programming, they held all the cards. Until now.

Just as file-sharing is hollowing out the recording industry, BitTorrent is having the same effect on the broadcast television industry. That effect is barely noticeable today – with the exception of certain notable examples such as *Battlestar Galactica* – but, as BitTorrent becomes more ubiquitous, and ever easier to use, more and more TV viewers will turn to BitTorrent, because it offers them a freedom and flexibility they can't hope to receive from a broadcaster. The broadcaster must satisfy the desires of millions of viewers, while BitTorrent is tailored to satisfy the desires of a single one. There's no way that any broadcaster can compete with that. This trend, toward on-demand viewing, is going to have a very specific effect on television broadcasting over the next few years: the broadcasters will move away from pre-produced programming, focusing instead on live broadcasts. Sports, news and “event” programming (which includes such things as awards shows and “reality TV”) will become the mainstay of the broadcaster's schedule, because these sorts of programs don't translate well into the find-what-you-want-when-you-want-it model of global digital superdistribution of television programs.

This transformation is already well underway. If you look at the most popular programs in America or Australia, you'll find that sports broadcasts (the Superbowl in the US, the AFL final in Australia) top the list. After that you'll see the finals of such shows as "American Idol" and "Australian Idol," live broadcasts that must be experienced as they happen. Because of the transition to digital broadcasting, broadcast television is being forced to return to its beginnings as a live medium. A live broadcast provides an experience you can't get anywhere else. It's the only way that broadcasters can hope to compete for your attention with ever-more-desirable media experiences – video games, DVDs, the Internet, and, now, BitTorrent TV.

All of this means that the producers of television series are facing exactly the same pressures as those experienced by the recording industry. The more popular their productions prove to be, the more widely they'll be shared. This is already obviously true, because shows like "CSI" and "The Sopranos", among the most popular shows on television, are also among the most widely shared. These production companies will have to develop new economic models to pay for their programming, because the television broadcasters will not be interested in allocating valuable airwaves to programs which a large portion of their audience has already seen. But, although this seems like a formidable economic obstacle to the future of television program production, it's actually the least of the industry's worries. File-sharing creates a far greater threat, one which the industry can in no way overcome – it creates a level playing field for the distribution of every television program, created by anyone, anywhere in the world.

Television broadcasters, in their role as the gatekeepers of the broadcast airwaves, have, through their programming decisions, defined our expectations for a television program. "Professional" television programs have high production values; they look and sound well-made. "Amateur" television programs – such as those which can be found on community-access cable channels throughout both the United States and Australia – have an "amateur" look precisely because they don't reflect "professional" practices in cinematography, editing, and sound recording. (A side note: as a teacher at a film school, I have become acutely conscious that the

low quality of “amateur” TV productions could be raised to a quality nearly indistinguishable from a “professional” production with only a few hours of training on lighting, cameras, and location sound recording. It isn’t rocket science – though it certainly requires training, practice and an aesthetic sensibility.) However, just because a television program is professionally produced, that doesn’t mean a television broadcaster or cable network will purchase the program. Many more TV programs are produced, every day, than ever find their way onto the airwaves. The airwaves are a limited resource, and the broadcasters act as the filter, using their own formulas to determine which programs they’ll air. Broadcast television is a mass medium, and this means that programs must appeal to the greatest number of people – a program which is well-tailored for a small audience will never find a broadcast outlet. Thus, as is the case with the recording industry, television broadcasters focus on hits, driven by the economic logic of advertising to consider ratings as the ultimate arbiter of worthiness for the airwaves. Sometimes ratings and quality meet happily in a television program – “The Simpsons” is a good example – but, more often than not, popularity simply means pandering to the mass taste. Hardly anyone is thoroughly satisfied, but no one is dissatisfied enough to change the channel. That’s the logic of scarcity: this program may be a stinker, but it might be the best thing on TV.

The days of scarcity are over. Suddenly the television productions of the entire planet have become available over the Internet. The doors to the world of television content have been thrust wide open, and, more often than not, an individual will find something far more desirable online than can be found on broadcast television. Even more significant than this, the gatekeeper function of the broadcasters has been obsolesced; now it is not up to the broadcaster what a viewer sees on the TV. That power has come to rest with the viewer. Productions which might be termed “amateur,” but which still relate a compelling story – to someone, somewhere – will compete, on equal footing, with productions that cost millions of dollars an episode to make. People *will* put up with low production values if they feel a story is speaking to them; faithfulness covers a multitude of sins. And, as television becomes a global, universally accessible resource, the “professional” producers of television will have to compete with a planet of “amateur” television producers, each intent on telling their own stories. Each one

of these “amateur” productions will be compelling to a small audience of viewers. But there will be so many of these productions – indeed, there already are – that a viewer forced to decide between a meaningful “amateur” production and a less meaningful “professional” production will nearly always opt for the “amateur” program. That’s where the viewer’s heart will lead him. When the tens of thousands of “amateur” productions do battle, on the level playing field of global digital superdistribution, with the few “professional” productions, the “amateurs” will win. Every time.

All of this means that, in this new era of television, the distinction between “amateur” and “professional” is a false one. (That’s why I’ve been using scare quotes to distinguish these terms.) A professional gets paid for his work; an amateur works for the love of his art. All things being equal, which of these two is more likely to produce something you find compelling? You might want to watch an episode of “CSI,” but you’ll have to decide between that and a thousand programs, from all around the world, which speak directly to you. Which will be more desirable?

There is no way around this explosion (or, perhaps, implosion) into a world of globally accessible television programming. We won’t turn the Internet off, and people won’t stop using file-sharing to distribute the television programs which have delighted them. Instead, the commercial organizations which have benefited from the age of mass media will be forced to adapt to the new reality of global superdistribution. And here, as with the recording industry, there are no easy answers. Some producers will opt for advertiser-sponsored programming (as FOX does with “24,” sponsored by Ford), but they’ll still find themselves competing against an ever-filling reservoir of television productions, all of them just as available, and all as desirable, as any episode they might produce. It is not clear to me how a television series producer will be able to find an audience when the entire world is competing against him for your attention.

We shouldn’t dwell on the fate of commercial television; it had its heyday, and perhaps that day has passed. It makes more sense to focus on the opportunities being presented to the rest of us. Suddenly, each of us has the power to become a

television broadcaster, and a television producer. I would be very surprised if this didn't lead directly to a renaissance of television, an explosion of offerings that will completely transform our expectations of the medium. Individuals, working with nothing but love and time, will make their own TV series, and share them with the world. In fact, this is already happening.

In March 2003, a couple of college students at the University of Texas dreamed up an idea to create an computer-animated comedy series. As none of them had a background in computer animation, they hijacked the popular videogame *Halo* to create the computer graphics, recorded these to digital video tape, edited it on a computer, recorded voices and a soundtrack, mixed it all together, and published their show on the Internet. "Red vs. Blue" was an instant smash hit on college campuses across the United States. The series features two groups of soldiers (one red, one blue, the colors given opposing teams in *Halo*), and their ridiculously existential exploits as they mostly fail to fight one another. Although the computer graphics are crude to an eye educated by Pixar and Dreamworks, they're more than sufficient to convey the story. And, in any event, "Red vs. Blue" isn't about digital eye candy, but comic timing. The comic sensibilities of the creators of "Red vs. Blue" – Burnie Burns, Matt Hullum and Joel Heyman – are as finely tuned as Larry Gelbart, who gave America "M*A*S*H" back in the early 1970s. "Red vs. Blue" explores the same issues of futility, authority and SNAFUs in the chain of command which made "M*A*S*H" such a success, and does it with the same comic sensibility. Although amateurs, the creators of "Red vs. Blue" create better comedy than most writers working in Hollywood.

Because the creators of "Red vs. Blue" had limited Internet connectivity – their web site couldn't handle the millions of download requests for each episode as they were released on the Internet – they were early adopters of BitTorrent. (I saw links to the "Red vs. Blue" torrent tracker on their website many months before I knew what BitTorrent was.) This meant that millions of copies of each episode could be distributed to computers around the world, without using very much bandwidth. And that meant "Red vs. Blue" got a big audience, globally, almost from the very beginning. Although the episodes are only a few minutes in length, the crew at Rooster Teeth (the name of their production company) have already

produced 38 of them (two seasons of 19 episodes), and offer them for sale on DVD, if you want a higher-quality viewing experience than what you'll get over the Internet.

In "Red vs. Blue" we can see every force of the new digital world described in these last fifty pages put into play: global superdistribution of digital media, embracing piracy, and the rise of the amateur over the professional. It's all here, and it's all working, because the creators of "Red vs. Blue" chose to play into the current, getting a speed boost from it, rather than trying, futilely, to paddle against it. Already, Rooster Teeth has announced a second series, "The Strangerhood," which looks like a crudely animated version of "Friends". These amateurs are giving the professionals a run for their money.

Everyone is a broadcaster, at least potentially. And everyone, if they have the time and dedication, can be a television producer with access to a global market. All this means that anyone, anywhere in the world, can roll their own television network. A broadcast network is really a collection of programs, together with a scheduled airing order for these programs. (In that, it's a lot like a song playlist you might create in iTunes.) And, although a network isn't strictly necessary in the age of global superdistribution, it might not be a bad thing. Networks serve as filters, editing down the wealth of content into an easily digestible stream. As more and more television programming becomes available online, it will get harder and harder to find what you're looking for – because there'll be so much more to sift through. That's where network programmers have a role to play: they can tailor their program selection to cater to a specific audience, with specific needs. But, in this new world of superdistribution, there won't be six networks, or a hundred, or a thousand. There will be millions upon millions.

One example of these networks of the future launched in Los Angeles on the 25th of September 2004. The brainchild of artist Jeff Cain and technologist Doug Goodwin, RHZ Radio uses a combination of AM broadcasting technologies and Internet-based superdistribution to create a roll-your-own radio network. There are two parts to the equation: in LA's Chinatown district, a "micropower" radio transmitter sends a low-power radio signal throughout the neighborhood. Anyone

is free to receive the signal, and listeners are encouraged to rebroadcast it. (The RHZ Radio web site provides instructions how to retransmit the RHZ broadcast, using a \$25 AM transmitter kit.) Cain and Goodwin specifically claim no copyrights over the content of the RHZ broadcast, and all of RHZ programming has been freely donated by individuals who want to share their own audio productions with the world. Listeners in other corners of the world (such as Australia) can receive the RHZ broadcast over the Internet at rhzradio.net. That signal can then be piped from the receiving computer and pumped into another low-power radio transmitter, and – presto! – you’ve got a radio network with global reach, all for just a few dollars. The simplicity of RHZ radio demonstrates just how easy it is for any individual to create their own global media network.

RHZ has a potential reach of billions of listeners – but, of course, as others copy the RHZ model (something Cain and Goodwin encourage), there’ll be a lot of competition for listener’s ears. RHZ Radio is the shape of the future, but it’s already here. And so, the giant radio networks – firms like Clear Channel and Infinity Broadcasting – now find themselves threatened by the same trends which are remaking television. The trend toward global superdistribution of “amateur” productions is universal across all mass media, and transforming the media landscape irrevocably.

the day hollywood died

A few days before I sat down to write *hyperpeople*, the main hard drive on my PC – which holds the computer’s operating system, and all of its programs – began to fail. I was very fortunate in that it failed gradually, over a few days, so I had time to take the data from that drive and burn it to DVDs. I probably haven’t lost anything important. But I did have to purchase a replacement drive and reinstall Microsoft’s Windows operating system, if only so I could watch my DTV. The folks at Compaq, who manufactured my computer, thoughtfully supplied a CD with my purchase for such an eventuality. All you need to do is pop the CD in, restart the computer, and it will automatically restore the operating system. Only one problem: it didn’t work. Despite my best efforts (and, when those failed, swearing, shaking my fist, etc.) the CD steadfastly refused to restore the operating system to my computer. Now I was well and truly screwed; a computer without an operating system is about as useful as an electrified brick. I could have run down to the store and spent a few hundred dollars on a new copy of Microsoft Windows - but I already owned a copy, included in the price of my PC. I shouldn’t need to purchase another copy. What to do? I had the software “key” I needed to “activate” a copy of Windows – that key Compaq had, rather more thoughtfully, taped to the casing of my computer. So all I needed were the bits that make up the Windows operating system. I didn’t need a legitimate copy of Windows, because, with my key, I could legitimate it. And I already knew where I could find an illegitimate copy of Windows: at SuprNova.org.

I discovered SuprNova.org on the day Russ Meyer, that great director of schlock cinema, passed away. As a fan of cult movies, I truly believe that Meyer’s *Beyond the Valley of the Dolls* (with a script by the then-aspiring screenwriter Roger Ebert) is one of the great classics of camp cinema. I didn’t own a copy of the film, but I suspected if I toured the BitTorrent web sites, I’d find one. It took me about five minutes to track it down, and another hour to download it. As the film filled my hard drive, I took a long look around the site which offered it up through BitTorrent, SuprNova.org. It billed itself as the largest BitTorrent site on the web,

and indeed, it felt like the Wal-Mart of digital media. Thousands upon thousands of films – new and old, classic and camp – together with more television shows than I could ever hope to watch, more cracked software than I could install on a dozen hard drives, video games, albums, everything that could be digitized and had been, all of it free for the taking on SuprNova.org. Many of the offerings were smuggled-into-the-theatre camcorder recordings of films that had only been released theatrically a few days before; others were “rips” of recently-released DVDs, complete with special features; or television series that had been shown on subscription cable channels like HBO. Almost all of it was clearly pirated material, probably worth several tens of billions of dollars to the copyright holders, and I could have any of it – for free – just by clicking the mouse.

The theft of tens of billions of dollars of *anything* is unlikely to go unnoticed. In an industry that depends on enforcement of copyright law for its revenues – film, music, software, and print publishing – such cases of copyright infringement are dealt with swiftly and severely. It all begins with a “Cease and Desist” order, a legal memorandum written by a highly-paid law firm, on behalf of their client – generally a movie studio or recording company - ordering the infringing party to immediately cease distribution of the infringing materials. Sloncek, the owner and operator of SuprNova.org, became a frequent recipient of these Cease and Desist orders, and replied to them, posting both the letters and his replies to the SuprNova.org website. Bitter and often hilariously funny, his responses went something like this: SuprNova.org was not in the United States of America, and so was not subject to American copyright law; furthermore, SuprNova.org held none of the infringing materials these lawyers claimed were being distributed through his web site. SuprNova.org was simply offering a service where people with various digital materials could locate each other.

Like Napster before it, BitTorrent does require a centralized server, a piece of software known as the “tracker,” which allows BitTorrent peers to find each other. That tracker must be accessed by anyone who wants to join in a BitTorrent transfer before the transfer can begin. The tracker is the key into the private club of peers. Unlike Napster, each BitTorrent tracker grants you access to only one piece of media; you can’t get access to the entire universe of available media

through a single BitTorrent tracker. One tracker per file, that's it. SuprNova.org offered a tracker "hosting" service; if you had a file to share, you could fill out a form on the SuprNova.org website, and it would automatically create a BitTorrent tracker which would allow you to share that file freely. It was simple, elegant, and it kept SuprNova.org's computers free of any infringing materials. You wouldn't find any music or movies on SuprNova.org, just pointers to others who were simply sharing those albums and films with their friends. Nothing wrong with that, is there?

This is almost exactly the same line of defense that Napster had used in court back in 2000; it didn't work for them, and it wouldn't work for SuprNova.org. Any inducement to the infringement of copyright is, in the eyes of the law, tantamount to copyright infringement. If you provide the tools to pick the lock, you are an accessory before the fact to the theft.

Just about fifteen minutes after I'd finished my download of a replacement version of Microsoft Windows, during the evening hours of the 19th of December 2004, whilst in the middle of a download of the 1968 Rankin/Bass classic *Frosty the Snowman* (I loved that film when I was a kid), SuprNova.org died. My download stopped, stuck at about 35% of the total. I tried to restart it. Nothing happened. Again. Nothing. And again. Finally, I just gave up, assuming there'd been a failure somewhere on the Internet between Sydney and wherever-in-the-world SuprNova.org housed its computers. (That, as it turns out, is in the new European nation of Slovenia.) I went to bed.

The next morning I got a panicked instant message from one of my Sydneysider friends. "They've shut down SuprNova.org!"

"What?" I typed in reply. "How'd you know that?"

My friend passed along a URL which sent me to an article on Slashdot, telling of how the Motion Picture Association of America (MPAA) had shut down three of the most popular BitTorrent tracker sites on the Internet – torrents.youceff.com

(France), TorrentBits.com (USA) and SuprNova.org. I read Sloncek's brief note, published on the SuprNova.org website:

As you have probably noticed, we have often had downtimes. This was because it was so hard to keep this site up!
But now we are sorry to inform you all, that SuprNova is closing down for good in the way that we all know it.
We do not know if SuprNova is going to return, but it is certainly not going to be hosting any more torrent links.
We are very sorry for this, but there was no other way, we have tried everything.

Then Sloncek pulled the plug on the SuprNova.org's trackers.

The MPAA, understandably anxious to stop the wholesale copyright theft through the three biggest BitTorrent tracker sites, used all the legal means at its disposal (which are substantial) to take them out of commission. It worked; these sites are dark, and there's no indication that they'll ever come back online. The MPAA has vastly more legal and political power than a web site operator; torrents.youceff.com survived on \$350 a month in donations from loyal users, while SuprNova.org earned only a little more money from advertising on its web site. None of these sites had really profited from the trade in copyright; all were essentially one-man shows, and none could afford the costs of a protracted legal proceeding. The MPAA's straightforward strategy is a staple of all modern warfare: pull out the big guns, and wait for your enemy to surrender unconditionally. Of course, the assumption here is that you really *do* have the bigger guns.

"Oh no." I wrote back to my friend. "Oh god no. They don't know what they've done. The fools. They don't know what they've done!"

Nietzsche said that history repeats itself: first as tragedy, then as folly. George Santayana said that those who cannot remember the past are condemned to repeat it. And Einstein believed the definition of insanity to be "repeating the same act, expecting different results." To these I must add one more: Hollywood loves a sequel.

Everyone had seen it coming; from early October 2004 the MPAA had been making ominous rumblings, widely reported in the media, about cracking down on the file-sharing web sites which trafficked in their intellectual property. Perhaps SuprNova.org's Sloncek, safely squirreled away in a land far from American jurisprudence, really thought he could escape the inevitable. But where the MPAA can't apply the pressures of the legal system, they can put other forces to work. No one really knows what happened (at least, no one who's talking), but I imagine that an official from the American embassy in Slovenia paid a call to Slovenian law enforcement authorities, and informed them of the situation; a situation which, if left unchecked, could escalate into an ugly international incident. At the very least the MPAA could threaten to cease distribution of American-made films in Slovenia; that'd create quite political storm there, as American films are the most sought-after movie properties throughout the world. But for the MPAA, with its enormous political clout in the US Congress, that would only be the opening shot. The MPAA could very likely place enough political pressure on Congress to get sanctions on Slovenian exports to the United States. I'm sure the conversation never got that far. The Slovenian officials got the point, and Sloncek was told to shut SuprNova.org down. Now.

The main page of the SuprNova.org web site kept track of the number of files which had been shared through it's BitTorrent trackers. That number regularly ranged into the millions. At any point at least a few hundred thousand individuals, all across the world, were happily using its trackers. And, on the 19th of December, all of those trackers died. Given what is already known about many of the individuals who participate in file-sharing – they're of college-age, well-educated and technically adept – it's easy to imagine reactions of SuprNova's loyal base of users to the MPAA's act of economic self-defense. They would feel as though someone had snuck into their rooms, and yanked the TV out of the wall. They'd feel robbed, violated, and very, very angry. To quote Bugs Bunny, "This means war."

Although the MPAA holds all of the legal and political cards, and can enforce its will throughout the world, they stepped into a hornet's nest when they had the

main BitTorrent tracker sites shut down. Due to the centralized nature of the BitTorrent tracker, the MPAA could strike at a few sites and shut down the majority of BitTorrent file-sharing. Most of the users of BitTorrent had never really considered how a centralized BitTorrent tracker made their activities so vulnerable to the influences of others. Now they were forced to confront it. The weakness of BitTorrent – the tracker – would have to be fixed. And the people who could fix it – those with backgrounds in computer science and network engineering – were among the most avid users of BitTorrent. In short, the MPAA had angered the specific group of individuals most empowered to do something about it.

It's not as though we couldn't have seen it coming. By its actions, the MPAA seemed committed to a replay – a sequel, if you will – of the RIAA's battle against Napster. While the RIAA won that battle, they lost the war, driving the file-sharing networks underground, and into technical evolutions like Gnutella, which, because of their distributed nature, have become essentially impossible to root out. By applying pressure to the ecology of file-sharing which grew up around BitTorrent, the MPAA is forcing it to evolve into forms which will forever elude its grasp. They aimed for the head of the beast, and instead shot themselves in the foot.

In the days that followed the death of SuprNova.org, you could read two different types of reportage about it: stories in the mass media, in which the MPAA congratulated itself for a job well done, having avoided the fate which befell the recording industry; and others, which appeared on geek sites like Slashdot, that told a very different story. The anger at the MPAA was matched by impassioned arguments about the importance of respecting copyright. As was inevitable in such an overheated situation, a “flame war” erupted, with *ad hominem* attacks, insulting and dismissive replies, and much, much more heat than light. Yet, occasionally, another voice came through, with a different message: “None of this matters at all. Exeem is coming.”

“What's that? What's Exeem?” someone would ask.

Then I'd read in reply:

Exeem is a new file-sharing application being developed by the folks at SuprNova.org. Exeem is a decentralized BitTorrent network that basically makes everyone a Tracker. Individuals will share Torrents, and seed shared files to the network. At this time, details and the full potential of this project are being kept very quiet. However it appears this P2P application will completely replace SuprNova.org; no more web mirrors, no more bottle necks and no more slow downs. Exeem will marry the best features of a decentralized network, the easy searchability of an indexing server and the swarming powers of the BitTorrent network into one program. Currently, the network is in beta testing and already has 5,000 users (the beta testing is closed.) Once this program goes public, its potential is enormous.

At first, the details about Exeem were sketchy; it was a piece of software that was reportedly already finished; it had recently entered a "beta" test involving 5000 volunteers, scoured from the most prolific contributors of torrents to SuprNova.org. These volunteers were shaking out the bugs out in the software before its public release. Then, two days before the end of 2004, more details about Exeem appeared on Slashdot. It was a commercial software package, supported by advertising, and it provided "a blending of the tracker, BitTorrent client, and decentralized indexing." That last item, the "decentralized indexing", meant that someone, somewhere had already figured out how to combine the best feature of Gnutella (its decentralized search mechanism) with the best of BitTorrent (it's ability to turn the Internet into a very efficient system for sharing files). Since the programming "source code" for both Gnutella and BitTorrent is freely available – both are "open source" software projects – it would have been only a modestly difficult engineering effort to blend the two together. Any reasonably competent college student could probably do it. And, in doing it, they would realize the MPAA's worst fears: a file-sharing network with no center to shut down.

The MPAA took a bad situation – the theft of billions of dollars of copyright – and made it worse, by attacking the most visible infringers upon those copyrights. By highlighting the problems with BitTorrent, the MPAA inadvertently pushed

BitTorrent users to develop and adopt a comprehensive solution. That said, the earliest reports of Exeem make it seem less than perfect. It is “adware,” meaning that you’re forced to watch a display of advertising as you use it to locate and download files. And that means that there is a commercial entity paying for the development of Exeem, an organization which is clearly hoping to recover its development costs through advertising sales. While that may not be a bad business model, it is a very dangerous legal practice: if Exeem has been created by a company (this company has remained in the shadows, and is as yet unidentified), at some point they’ll need to step forward and pick up payments from their advertisers. When that happens, the MPAA will certainly sweep in and shut it all down. And the crazy spiral towards the invisible and all-pervasive sharing of motion pictures will tighten, and intensify.

It could have happened differently. The MPAA took the wrong lesson from the troubles of the recording industry. They thought it enough to nip the problem in the bud. Shut it down before it gets out of hand, and you’ll keep control over your copyrights. But that’s not the real lesson of the RIAA vs. Napster, even if it is the obvious one. The real lesson is that you can’t defeat file-sharing: you must learn to develop strategies to profit from it. If, instead of suing SuprNova.org out of existence, the MPAA had said, “let’s make a deal,” they could have worked to develop a strategy which would have allowed them to monitor and possibly control properties under copyright. The beautiful thing about SuprNova.org was that *it was centralized*; with one stop the MPAA could have had its fingers deep inside the hard drives of nearly every BitTorrent user in the world. From there, anything could have been possible. But now, with SuprNova.org gone, there is no center. And there never will be again.

The film industry, one of America’s largest export industries, is facing exactly the same challenges which confront the recording and television industries. File-sharing allows anyone, anywhere in the world, to possess the properties which, through their own marketing efforts, the movie studios have made so intensely desirable. The more marketing dollars spent to promote a film, the more it occupies public awareness, the more widely it will be illegally traded. Add to this the rise of the global superdistribution of digital media, which gives every film

maker direct access to every person with an Internet connection, and Hollywood now finds itself forced to compete against a planet of film makers who don't care as much for box office receipts as that their works be seen by the largest numbers of people. Film, like television and music, is an art form, and many people do it just for the love of it. You could call them amateurs, but quality is in the eye of the beholder, and a great many great films have been made by amateurs. Now they can reach the rest of us with their work.

The age of mass media is already over. Through inertia, financial power and political connections, the media giants who dominate the landscape of the communications industry will continue in their present form for at least a few more years. But these colossi, like Hollywood sets, look more substantial than they really are. A wind, which is already rising, will push them over like houses of cards. If any survive, it will be because they have adapted themselves to the world as it is, not the world as they would like it to be. The days have passed when many passively consumed the productions of a few; but we are only just learning our way around this new landscape, where everyone can reach everyone else. It offers us some enormous opportunities, but will present us with such an overwhelming and seductive set of choices that, unless we carefully manage this transition, the world will become far more confusing, chaotic, and fragmented than ever before. With that, it's time to examine the technique already emerging to manage this madness: social networks.