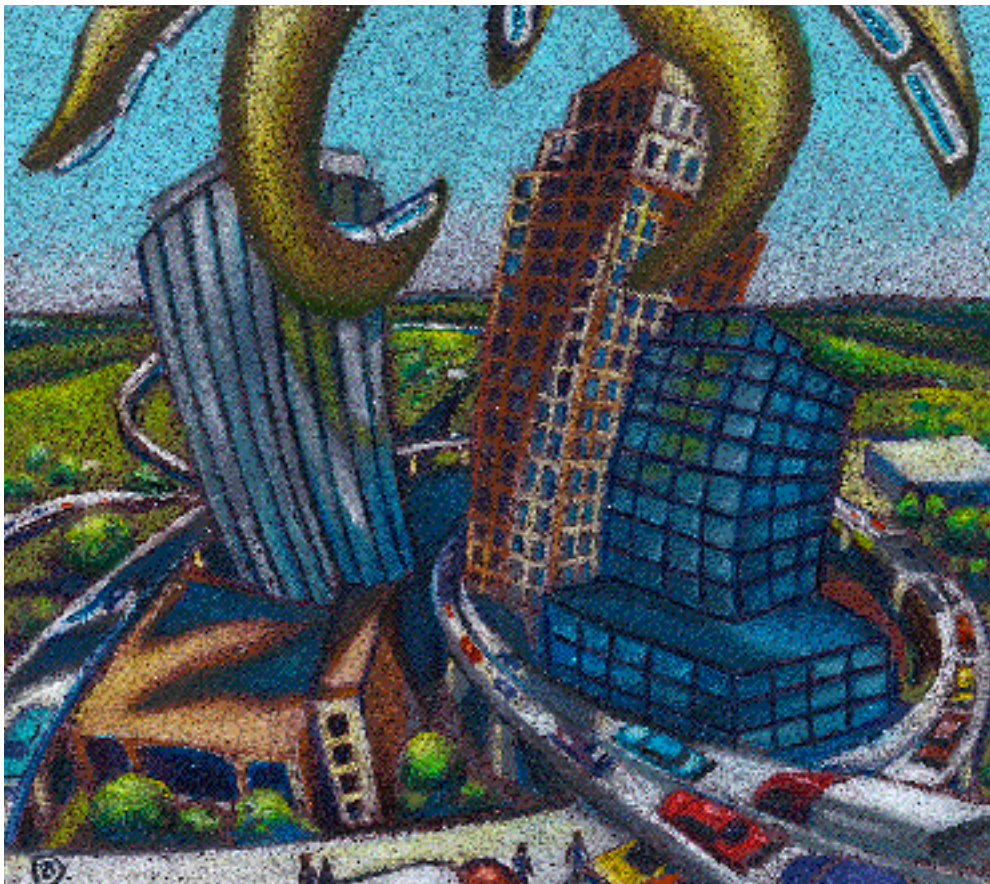


Death *From Above*



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Over the last 30 years, the American CEO corps has included an astonishingly large percentage of men who piloted bombers during World War II. For some reason not so difficult to guess, dropping explosives on people from commanding heights served as a great place to develop a worldview compatible with the management of a large post-war corporation.

It was an experience particularly suited to the style of broadcast media. Aerial bombardment is clearly a one-to-many, half-duplex medium, offering the bomber a commanding position over his “market” and terrific economies of scale.

Now, most of these jut-jawed former flyboys are out to pasture on various golf courses, but just as they left their legacy in the still thriving Cold War machinery of the National Security State, so their cultural perspective remains deeply, perhaps permanently, embedded in the corporate institutions they led for so long, whether in media or manufacturing. America remains a

place where companies produce and consumers consume in an economic relationship which is still as asymmetrical as that of bomber to bombee.

The lopsided character of this worldview has been much on my mind lately with regard to various corporate projects on what they are all too pleased to call the “Information Superhighway”

electronic frontier

(evoking as it does the familiar comforts of Big Construction by Big Government in cooperation with Big Business). The cable companies and Baby Bells have a model for developing the next phase of telecom infrastructure which, were it applied to the design of physical superhighways, would have us building them with about 5,000 lanes in one direction and one lane in the other.

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Nursing such gloomy metaphors as these, I was encouraged to receive an email message recently from Gordon Bell, one of the titans of computing, with the cumbersome but evocative subject line: "Building Cyberspace with One-Way Streets—Bad Idea? Conspiracy? Short-sightedness? Incompetence?"

In it, he exhorted me and a number of better qualified digerati (including The Media Lab's Nicholas Negroponte and Bellcore Vice President and telecom god Bob Lucky) to put our "bodies in front of the backhoes that are installing asymmetric networks that simply mimic cable TV."

There followed a passionate argument against what appears to be the default asymmetry and the following vision of a better future: "The distinction and needs between homes and offices will disappear. Also, there needn't be places like information warehouses that are the sole video providers into the network to form new franchises and monopolies. Every home should, in principle, be capable of being a producer or consumer. This needs to be the goal of the information highway."

Unfortunately, as things stand, it isn't. At least it is in no way the

goal of the institutions that are currently building the more overtly commercial aspects of it. Whether cable companies or telcos, they see the NII as pay-per-view on steroids. They seem to envision their economic future in creating for the general consumer the ability to watch any movie or rerun without risking such human interaction as a trip to the video store might produce.

The strangest aspect of this vision (or trance) is that pay-per-view has been available for nearly 20 years and has never, to my knowledge, managed to penetrate more than 18% of its possible target market of cable subscribers. The idea that this unpopular service will power our economic future would seem preposterous on its face were not some many billions headed that way.

Institutions from John Malone's TCI to Oracle are building titanic video servers, the mothers of all mainframes, in order that they might blast down at you "My Mother, the Car" or "Motel Hell" at any moment you might hunger for that sort of thing. From these great repositories of digitized dreck will dangle a thatch of fiber/coax tentacles, one of which will presumably extend its coaxial tip into your living room.

One popular design model would initially offer a gigabit comin' at ya and about 200kbps of back channel, presumably to support the "buy" button on the remote controller of your set-top box and other such boons of "Interactive" Television.

In this model, the telco runs a fiber into a neighborhood of about 500 homes, connecting subscribers to that point with coax and modems. Downstream from the distribution point there would be about 200MHz available, from which the modems can derive about 5 bits per hertz, giving 1Gb for video services of whatever sort.

Upstream is a different story altogether. There you've only about 30MHz. available in the

whole neighborhood router, and the modems only derive about 2 bits per hertz, leaving a pool of 60Mbps to be shared by the 300 customers, or, as I say, about 200kbps. Not much more than AppleTalk.

To be honest, that's a little misleading. The back-channel 60Mbps pool can be switched dynamically between users. Thus, the average available might be as much as 1Mbps, given that not everybody in a neighborhood will be sending bits upstream all the time.

While this wouldn't be all the bandwidth a byte-pig like me might want, it would be a hell of a start. But there is also the question of whether it will even be available to the customer. Most of the models I've seen, cable or telco, seem to reserve it for their own purposes. I believe if they were willing to open it up to the users, they would, as Mitch Kapor speculates, "quickly find there was far more demand for the service than they imagined." Mitch goes on: "This would be a good thing as it would speed up their accepting the inevitable."

What about the economics? A full fiber installation might cost as much as \$1,500 per home. At 100 million homes, that's quite a bottom line. No one is seriously going to ask the telcos and cable companies to pop for an upfront investment of \$150 billion in a market even they can't seriously believe in, but one wonders why they are designing such hard asymmetry into their local distribution systems.

For one thing, this \$1,500 is only \$500 more than the \$1,000 which is the rough average cost of installing a new copper pair. Given that there are many new hookups, both cable and telco, installed daily and many equipment upgrades as well, it's probably more accurate to say that the incremental cost of nearly universal fiber-to-the-home would be something on the order of \$20 billion to \$25 billion. That's still

real money, but a price one can imagine the market bearing.

Furthermore, it would seem a good bet on a highly imaginable future to lay dark fiber in these trenches while they're open, a relatively cheap thing to do, and to install the expensive parts—the lasers at each end—when the market is ready. But very few of the new connections and upgrades being installed at the moment are taking advantage of the opportunity. When the trenches close they are, in most cases, closing on coax alone. Laying the fiber will

petroleum company stating in 1900 that since there wasn't much of a market for gasoline it was going to stick resolutely to medicinal oils, based on proven market demand. Fortunately, it wasn't too difficult to retool refineries to produce gas when the automobile hit big, but one wonders how much it's going to cost to replace all those fixed asymmetrical modems and routers.

Actually, I think it would take a market demonstration of retina-searing obviousness to veer the cable-tel dinosaurs in the direction

episode is going to lure them back. They want to interact with other people, not "content," and they are using computers to do it.

Indeed, this generation's "what's your sign?" pick-up question is already "where's your home page?" And what's the point of having a home page you can't illuminate with QuickTime videos of yourself being morphed into a Klingon or an audio clip of the latest cut by your band? Kids like these are going to want their home pages at home and not on some distant server where security con-

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require their being reopened.

There are other nonrecoverable costs associated with the asymmetric approach the Big Boys seem stuck on. When the folks at the edges start clamoring for upstream capacity, it will be necessary to replace all those ADSL modems and other neighborhood routers of fixed asymmetry at a time when they will be, in my projections, fairly new. We can argue about the time frame, but it seems wasteful to be installing new equipment that will be junk sooner than not.

What are the economic or technical disadvantages of designing the fiber drop-to-home architecture so that it would provide flexible bandwidth allocation now, even allowing upstream asymmetry if called for? I mean, I thought one of the beauties of ATM was its ability to rapidly re-deploy routing and bandwidth on demand.

The answer I get back is that there is no serious demand for upstream services while the cable business has at least demonstrated a market for downstream services. If you take this answer seriously, which I don't, this is a little like a

of symmetry. In the meantime, there is a good chance such emerging mammals of local bit provision as Broad Band Technologies Inc., WilTel, maybe even your local electric utility, will have done such a good job of addressing the upstream digital market that remaining entry share will be too limited to feed the thunder lizards.

It already seems obvious to me, and to anybody who's launched Mosaic lately, that the market for upstream bandwidth is about to explode. Bandwidth is one of those things similar to money, sex, and power. The more you've got, the shorter it feels. And there are now a critical number of Americans who know what bandwidth is and why it feels good.

Look at what's happened on the World-Wide Web, where traffic grew 1,713% in 1994 (which, though down from the previous year's 443,931%, is still pretty rapid growth). These figures reflect a burgeoning generation of Websters under 25 who have already started to give up television in droves. Not even the instantaneous availability of every Brady Bunch

considerations are going to prohibit rapid, interactive updates. Furthermore, these are kids who went all the way through college at the end of a T1. They're as likely to patiently await images to form in the developing bath of modem transfer speeds as they are to take up a life of prayer and contemplation.

Businesses are rushing to put up Web sites which will contain their catalogues and from which people will be able to order all manner of goods, hard and soft. If you're selling anything made of bits, whether it's Photoshop filters or interactive pornographic films, you're not going to require your customers to receive their orders at 200kbp. Nor will it make business sense to rent space in the virtual mall of one of Larry Ellison's monster NCube servers.

Then there are the increasingly fuzzy boundaries of the American workplace. People are commuting less and traveling more. They want to be able to jack in, either at home or in the Marriot which all too often serves as home, and get the same access to information they have on the ethernet in

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their official office. Nobody wants to be on a LAN which runs at 14,400 baud, whether their office is traditional or virtual.

I could go on at great length but it wouldn't matter. I would convince no one in the telcos or cable companies. The problem isn't the lack of a potential market. The problem isn't cost. The problem is consciousness. And culture. What they see is what you get.

This was especially evident to me recently when I had an opportunity to debate these issues publicly with John Malone at a conference at the University of Colorado. Now John Malone is a very smart man. Up close, he has, like Bill Gates, the kind of leaping intellectual force which

is likely to make anyone feel like the lazy brown dog.

John Malone knows the media transport business. But when all you've got is a hammer, everything looks like a nail. He knows broadcast. He knows one-to-many. He knows strategic bombing. He is no more likely to recognize the potency of such guerrilla markets growing on the Web as General Curtis LeMay was to regard the Vietcong as credible opposition.

I kept trying to convince him there would be an enormous and growing upstream surge as more and more individuals and small businesses put up Web sites, rattling off a long list of all the things which are already appearing on them.

Finally he conceded the possibility with some exasperation, but

said that even if he could see a way of making money there, providing upstream bandwidth was not necessarily a business he particularly wanted to be in. For almost theological reasons, he wanted TCI to remain in the center even if all the action moved to the edges.

In fairness, George Gilder thinks Malone may have been putting me on. When I mentioned this episode to Gilder, he said, "Faced with 150 channels of DBS competition, with better resolution and audio than the studio NTSC at the headend, cable has to serve computers with bandwidth or it will go out of business. All the cable people I talk to—including many who work for John Malone—know this very well." They may know it in their minds, but can they have the religious conversion necessary to know it in their hearts.

And indeed we are talking about religion here. On one side you've got the monotheism of Control, the one-to-many system which has dominated the West at least since the Industrial Revolution, possibly since Gutenberg; possibly since Moses. And done a damned fine job of creating civilization, I might add. A necessary thing in its day.

Surging toward these battlements of God Above All are the galloping, barbarous hoards of pantheism, guerrillas all, from the Cyberpunks to Newt Gingrich. I sometimes wonder which of these groups I really want to win, but I'm pretty sure which one will prevail. It's B-52's vs. punji sticks. It's machine against nature. Sooner or later, nature takes the game.

No matter how much death they rained from above, the bombers lost Vietnam. They're going to lose cyberspace too, for exactly the same reasons. **■**

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