



The COOK Report on Internet



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The Internet's Dilemma: What Good Is the Stupid Network If the Other Guys Own It? Future to Offer Access to a Public Highway Grid or Exile to Corporate Controlled Walled Gardens and OS'?

An Analysis by Gordon Cook

How are we to understand reality as we shake off the hangover of our Internet intoxication and face huge, corporate controlled "Walled Gardens" of content delivery and monopoly OS? These "Walled Gardens" are carefully controlled 'parks' of vendor content combined with software designed to encourage users not to stray out of the content Garden. On the monopoly OS side of things (Windows XP) the user finds a Microsoft provided family of compatible software tools and services (dot Net) designed to lure customers into tying more and more of their daily lives to the vendors products and services. The AOL/Time Warner model is built on the old assumptions of top down user control and manipulation to sell as much content and connect time directed to appropriate web sites as possible. The Microsoft model captures the customer as a reliable source of recurring revenue on a monthly basis for the vendor's software and services.

During the consolidation of the "content-is-king model," the Internet industry has built up huge capacity of both fiber and bandwidth – one that far exceeds the ability of the AOL/Time Warner business model and related developments to absorb in the short term. Consequently, the old dot com Internet industry has fallen into limbo while people are suddenly looking for a basis on which to rationalize its future existence. This state of affairs would

have been unthinkable a year ago to all but a few. Even now it is not adequately understood by the industry. The decline of the last six months has been precipitous. Unfortunately, we likely have not yet neared the bottom. We are in a serious muddle with the captains of infrastructure companies refusing to treat stockholders with sufficient candor. The situation is worsened by the fact that neither the FCC, the Congress, nor the Bush administration has a clue that anything is seriously amiss.

Trying to bring some focus to our dilemma, this essay points out that the edge-controlled organizational principals of the Internet, where no central authority dictates precise behavior, can develop, given some assistance from government, into an alternative model to that of the central control of the "Walled Garden" and monopoly OS. This alternative model is centered on exploring a slowly emerging reality of customer owned networks. Telecom as an asset and not a purchased service.

After a decade of the commercial Internet, that system, while it has adopted many Internet technology tools, has ownership constraints and customer structures that have supplanted the open, anarchistic and innovative style of the edge controlled Internet in its early commercial stages. This alternative, innovative model remains most alive in the Canadian's work on customer

Volume X, No. 6, September 2001
ISSN 1071 - 6327

owned networks. Despite Chicago's Civic network, this model is not likely to take hold in the United States unless and until national policy makes possible an arena of the local ownership and control of infrastructure. Preserving the opportunity for local ownership and control, will permit experimentation with the innovative research into reducing the cost of high speed networks as has been done in Canada. The combination can create an environment where the next bandwidth killer application is much more likely to emerge. (Some do suggest however that new telephony, video and audio capabilities in XP also may

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have an impact on bandwidth demand.)

This essay argues that sound public, economic and technology policy depend on the development of the alternative model in order to ensure the survival of diversity in our media and telecommunications. Finally, it argues that the introduction of the customer owned network model is likely the only means of returning liquidity to the telecommunications section any time soon. Pump priming in local communities could begin to do much to soak up the extra capacity. Thus, the establishment of a public sector alternative is in the interests of many large IT companies. It may also be an idea whose time has come. According to the June 25, *Interactive Week*: "today more than 260 state and local governments operate telecommunications businesses ranging from cable television to local phone and Internet services." <http://www.zdnet.com/intweek/stories/news/0,4164,2779728,00.html>

Note that sixteen findings of fact summarize this essay on pages 45-46 below. Readers are asked to study them before finishing this essay.

Let's begin the journey that has brought us to these conclusions.

As the "smoke" clears, serious issues exist, both at the application and the infrastructure levels. Above TCP/IP, at the application layers we have the Microsoft death star slugging it out with the AOL-Time Warner death star. Huge vertically integrated, would be monopolies of transport and content or OS and content. Not the most efficient way to do business, but because of market share, both companies have great inertia as they move forward. Control of content by those who also own the distribution channel is a serious public policy issue. If you have any doubts, see for example the statement by Scott Cleland in a June 27 Precursor Group Advisory: "Invest in the 'legal' exercise of market power. Precursor believes an investment 'sweet spot' exists with companies that have the market power to unilaterally lessen competition and raise prices, but do not abuse it to the extent that it results in serious

antitrust enforcement. The best examples are: AOL-TW bundling "tele-applications" like instant messaging; cable integrating vertically into broadband services and content; . . . ; and finally maybe Microsoft bundling "tele-windows" applications into XP."

On June 28th *San Jose Mercury*, Technology Editor, Dan Gilmore commented. "Microsoft and its acolytes are purring with delight today, at least publicly. But, they didn't win the overwhelming victory that you're hearing about. Not even close. From the ruling (PDF file, about 420K) by the U.S. Court of Appeals for the District of Columbia: Given the limited scope of our disqualification of the District Judge, we have let stand for review his Findings of Fact and Conclusions of Law. . . . The court may have overturned the breakup order. But by the same unanimous ruling it accepted Judge Thomas Penfield Jackson's findings of fact and ruling that Microsoft a) has a monopoly in the relevant market; b) used unfair business practices to maintain its dominance; and c) has to be restrained from further abuses." Gilmore continues: "What Microsoft has won is time. It can continue its brutal practices for a while longer, building into Windows and Internet Explorer and Office any and all technologies that will further solidify the monopoly. It can extend its reach into new markets, using its \$30 billion in cash (which grows by a billion dollars a month. The company surely figures that it'll be entirely above the law by the time the law catches up. It may work. It has so far." Ironically if the opinions of some who have seen Windows XP are correct in addition to driving a new generation of corporate PCs, its exceptional capability in real time messaging, voice (through its sip client), and video could also begin to soak up some of the industries surplus bandwidth.

This battle is also one over control. Control of the ICANN DNS root. One had better watch whether the Internet Routing Registries are arm-twisted into accepting contracts with ICANN requiring recipients of IP number to use only the ICANN root for their DNS or lose their IP numbers. If ICANN wins the

DNS wars we shall see the price of maintaining websites rise. We shall also likely see attempts at websites licensure. To the extent that these issues are all entwined with moves by conglomerates who see their intellectual property threatened by the Internet to build safe controllable distribution channels, the rest of us need to be afraid. Walled Gardens are indeed being built to minimize the possibility of the linking of opinion and speech beyond what the concentrated corporate global media are willing to allow.

Moving down to the infrastructure level, we must realize that the "nethead" versus "bellhead" dichotomy may have outlived its usefulness. The bellheads have spent billions on building their own IP networks. A sober look at reality says phone companies will not turn into stupid network Internet companies over night as their only path to survival. They are doing quite well as phone companies thank you. In fact, how well they do seems based, more and more, on the facilities that they own. Every telecom player has built TCP/IP data networks and in this respect is playing in the internet game. Depending on its customer base, one company's network will be structured a bit differently from that of its competitor. But contrary to the expectations of some pundits, it's hard to see any "pure" internet plays out there. Hard as Level 3 and a few others tried, the PSTN was simply too big to swallow. Everyone had access to both Internet (nethead) and circuit switched (bellhead) technology and everyone used that access.

No Longer Internet Versus Telco

Despite the protestations of folk like George Gilder, there is no longer any such thing as technology that is inherently "right" for use by "netheads" and different technology, the choice of which condemns "bellheads" to abject failure. For example, gigabit Ethernet versus SONET. Since products first introduced by Cyras and Cerant in 1999, the cost curve of SONET for lighting new fiber pairs is way down and performance substantially increased. (Much more about

this in next month's issue.) SONET is more likely to be used by the "bell heads" simply because of who their customers are and experience gained in operating their voice networks. Rather than a tool chest of ideologically right or wrong technologies, what we have is the ongoing development of a general tool chest of transport technologies that is delivering astounding increases in available price performance for moving bits. Telecom providers' choices of tools from the tool chest are governed by their understanding of who their customers are, what their geography of service for those customers is, and whether or not they own the physical fiber on which they will deliver the bits.

It no longer makes much sense to think of Internet versus telco. Business model and approach is determined by the mix of facilities owned. Plans to force the sharing of facilities simply haven't worked. The last two or three years have taught us that ownership of the physical transport media is likely to be the major determinant of architecture and characteristics of one's network. The Internet began as a collection of voluntarily interconnected private networks. There was no single owner of the Internet and no one to establish top down rules as in the case of phone companies with their vertically integrated infrastructure that was centrally managed and controlled in the manner of the 19th century railroads. However, the multiple national and metro fiber nets that have been built since 1995, have been perhaps just as expensive to build as the railroads of the 19th century.

This infrastructure was built quickly on what turned out to be the myth of Internet time as well as bandwidth. Build it and the customers would come. The problem was that suddenly you had the carriers building data networks to sell to enterprise customers that were to a varying extent subject to ILEC control in the local loop. You had the new Greenfield players going after the same business market. The question was how would these businesses go up against the local loop. Some like Level 3 and Metromedia tried building their own

local loops. Trying to do some reasonable portion in five years of what the ILEC had done over a century, they went deeply in debt.

Others with business plans in hand sold policy makers on the idea of the CLEC. Competitive Local Exchange Carriers were to be structured on the assumption that legislation could convince the incumbents to grant 'equal access' to competitors. We now have had five years of experimentation with the theory that local loop competition is obtainable by forcing the owners of the local loop to enable competitors to sell access at the IP layer and above. Such was the CLEC idea. By the summer of 2001 the CLEC concept of competition has crashed and burned.

The ILEC is more entrenched than ever in the local loop. Companies like Next Link were supposed to bring competition at least to office buildings in its metro markets. Instead it is deep in debt and cash strapped and will likely soon be joined by Yipes!, Telseon, and Sigma rushing into metro markets where owners of the fiber itself such as Metromedia Fiber Networks and Level 3 are ready to sell against them.

What one has therefore at the transport level are the ILECs as firmly entrenched in the huge PSTN as ever. Some business CLECs are still trying to compete for enterprise services against the ILECs. The old line carriers are being squeezed in the middle as new competition drains their long distance voice revenues and everyone joins in a throat cutting frenzy of using fiber, wireless and even copper to bring broadband to the enterprise. Welcome to the chaos of the 'free market.' A structure that can't sustain itself has been created. As it sorts itself out the critical public policy questions will be first whether government does anything to maintain open and equal access to physical rights of way. The second critical issue will be what policy does to move toward enabling customer owned networks.

How the Internet Arrived at Its Current Position

Over the last decade the technologists have who have created the internet revolution have carried Moore's law into telecommunications for the first time. Although for political and structural reasons, prices do not yet reflect this, they have given us technology that could bring a gigabit of bandwidth into every home school and business in the nation for \$100 a month. They kicked off an enormous speculative frenzy that is now in the process of collapsing. The irony is that after a trillion dollars of investment the difference that has been made in our lives may be turning out to be relatively trivial. The greatest revolution in the history of telecommunications that came in with a roar six years ago looks to have been rendered impotent by a combination of political and ideological short sightedness. The technology is there. The fiber is there. The tools to deliver the bits are there. There's only one small problem. They are for the most part tantalizingly out of reach. The ILEC local loop monopoly in the wake of a grand failure of public policy stands unchallenged. For some the thought that the ILEC may soon provide long distance is seen as heralding a return to the pre 1984 monopoly.

The internet revolution has led us to this state of affairs where over the ILEC ramparts we can just make out our promised broadband Nirvana. It is cordoned off in fiber rich trenches belonging on a national scale to perhaps two dozen fiber network companies who bet the bank that if they only borrowed enough, they could obtain first mover advantage and build a global infrastructure that they could control. Having grossly overestimated the growth of demand for Internet bandwidth, they borrowed billions to enable themselves to meet the size of the most expansive reality they could imagine. With everyone racing to grab the free riches of their new start ups' IPO, it became in the interest of each new entrant into the field to maintain the myth of bandwidth demand because then there would really be room in the marketplace for them as well. Everyone did it because everyone else was doing it and

– for a while – they got away with it.

In the US a lack of regulation left freedom for rapid technology evolution. It also made gathering of information across the industry difficult enabling perpetuation of the bandwidth myth. Isenberg's analysis of the Stupid Network in the summer of 1997 was 'spot on.' But, while it spoke the truth, it also helped to nurture an unhealthy arrogance among the Internet faithful. One which said that since the cost of building and operation of the stupid network was 100 times and eventually 1,000 times less than the money needed to power the intelligent network, the stupid network would inevitably drive the intelligent network, wedded as it were to the preservation of its antiquated copper local loop, out of business. The figures were writ large said the net heads. It was time for the bell heads to realize they were the dinosaurs and obediently die. The detachment from reality was profound. Even as PSI was sinking under a billion dollars of freshly accumulated debt, Bill Schraeder, PSI founder and CEO allegedly told his December 2000 Christmas party that the company that would collapse and go out of business long before PSI did was AT&T. Possession of the politically correct technology, Internet technology, was thought by the net heads to be the requisite ingredient for success. The libertarian philosophy that ran strongest through the net heads reassured them that their Internet was not regulatable nor controllable. Lawrence Lessig in his seminal 1999 book, *Code and Other Laws of Cyberspace* argued persuasively to the contrary. Most did not listen.

It was the bell-headed dinosaurs who in the end turned out to have a political intelligence that has trumped the net-heads. The national infatuation with what lobbyists portrayed as a free market gave us the 1996 Telecom Deregulation Act. Restrictions on combined ownership of transport and content and on ownership of telecom broadcast and print media in geographic markets were thrown out in exchange for a baby bell promise to allow competitors access to their networks. The act created whole new families of jargon. RBOCs became

ILECs to distinguish themselves from the newly arisen and supposedly nimble CLECs. No one chose to notice that the freedom given the guardians of the local loop was the freedom to merge and use their guaranteed rates of return to buy each other up. The net heads had no guaranteed rates of return. They had instead a blind faith that their technology was so disruptive that it would sweep everything else away. They seemed not to notice that they had had to do such things as gain access to DSLAMs under the physical control of their ILEC competitors in order to give acceptable service. They seemed to believe that the ILECs really had no choice but to sit back and watch the CLECs eat their lunch. Northpoint is gone. Covad is on the brink and what broadband Internet has reached American homes is primarily from the Cable companies. Eight RBOCs have become four giant ILECs with legal and lobbying staffs and boundless flows of money to point the finger at the foolish net headed Internet innovators.

Barred from long distance, with the help of Al Gore and Jay Rockefeller, the ILECs made their shrewdest move in the 1996 Telecom Reform Act. The emergence by then of the first two to three thousand independent ISPs demonstrated that barriers to entry into the internet flavor of telecommunications at the edge of the network were low. Given the libertarian bent of the times one of the most remarkable triumphs of the bell heads was their successful passage through congress of a government controlled program straight out of the best socialist traditions of the 1960s. The Schools and Libraries Corporation was created and merged with the remnants of the universal service fund with the task of making sure that all of Americas public schools and libraries had access to the Internet. Although the enabling legislation made it very clear that the means of connection to the Internet that this tax would support was to be technology neutral, the RBOC-friendly legal staffs at the FCC were able to implement a fix. As Dale Hatfield who was the Director of the FCC Office of Engineering at the time told me in June of this year it was the FCC's own lawyers who looked at

the legislation and assured the FCC's technologists that the legislation gave the FCC no choice but to restrict the use of the funds to buying local wireline connectivity services, year after year after year. Spread spectrum wireless radios that could create an infrastructure independent of the ILEC local loop were forbidden.

With a single flourish of the pen the ILECs were handed a new local tax that now exceeds 8% on every phone bill, business and residential in the United States. Starting at just over two billion a year, the SLC is now pouring more than four billion a year almost entirely into ILEC coffers. The massive paperwork required to receive funds from this huge bureaucracy has meant that few small locally-owned or community-based ISPs have managed to receive any of the subsidies for connecting schools. What the program has done is taken control of local school and library internet connectivity away from the communities that pay for it and delivered it into the hands of a federal bureaucracy where congress with requirements for filtering software reduce all local standards to the lowest national common denominator. Unfortunately, few understand how the SLC has defrauded them by removing from the community's control what the community is paying for anyway. Moreover the program distorts the market by incentivizing the local communities to utilize the ILECs (to the detriment of community-based providers) while it provides national subsidies for ILECs to further amortize their obsolete copper infrastructures and learn the internet business. It forces all Americans to provide a second subsidy to the ILEC's copper local loops. In doing so it ensures that the United States will never be able to repeat the condo fiber build pioneered by the Canadians. It ensures that local taxes enforce remote stock holder guaranteed rates of return instead of enabling local communities to buy or build their own locally owned and controlled fiber infrastructure.

Cisco pares 20% of its workforce, Lucent teeters on the edge of bankruptcy. Nortel sheds 30% of its work force and ties General Motors for the largest quar-

terly corporate loss in history. The makers of the hottest new optical transport technology are on the ropes. Level 3 lays off 25% of its work force and Global Crossing loses 50 percent of its value in less than a week. We are downing in a glut of unlit fiber and suddenly unsalable 'new and wonderful' Internet transport technology. We may be on the edge of a 500 billion dollar fire sale of net head Internet technology.

On the Edge of a Fire Sale?

The stark question that may soon be asked both here and in Canada is who will be allowed to buy? Who is able to buy? For the last 3 to four years the Canadians have had a ready answer. Their schools and municipal governments, through a fortuitous combination of services, have been building customer owned dark fiber nets. Canada's national policy has been well preparing its citizens for what they now face. An era of customer-owned and operated networks. American policy on the other hand has left us with an infrastructure where, when the fire sale begins the ILECs, with their guaranteed rates of return, are likely to be the only ones with enough cash to purchase and then hold what they have bought off the market to ensure that they enjoy another 20 years amortization on their copper loops.

We might fantasize that, if we were actually capable of enunciating a public interest in Washington DC, lawmakers might craft a means to return the school and library fund taxes to the local citizens who pay for them and provide some guidance on how local communities could select and acquire the most advantageous and appropriate solutions for their communities instead of having everything go to the ILEC and its distant stock holders. The only problem is that, unless they could be found among local ISPs, we may not have local technology leaders who have the potential ability to help local communities carry out their march to local telecommunications independence. We were developing them within schools and within local ISPs before the SLC inserted the ILEC fifth

column into our communities. If we look for leadership nationally we may find that missing as well. We might hope that the pending five year review of the Schools and Library Corporation would provide an opportunity for congressional inquiry into the current situation.

The Internet revolution has come and, in the absence of intelligent public policy, it may have already gone. It has created a tremendous burst of innovation. A burst that now looks to have been mismanaged to the extent that the people who did the least to advance the new technologies seem most likely to control them. We may be left not with the edge-controlled intelligence of the Stupid Network but with the central authoritarian control of the likes of AOL Time Warner owning the content and leasing the conduit from "ma bell," while together they carefully plan to influence public thought and "monitize" every customer minute. This happens while Microsoft plans to use its OS monopoly to let it insinuate its software into controlling all our personal data while charging us a monthly rental fee for what we used to own and control ourselves. Divestiture of the ILEC local loop is an attractive looking answer to our problem. But Verizon with its political muscle has just killed that in Pennsylvania. In the absence of an extraordinary upheaval, the bell heads may well have won.

Is Public Policy About to Become as Important as Technology?

Given the situation that we have just described, it seems increasingly inevitable that we are facing two choices. The imposition on telecommunications in general and the Internet in particular of the centrally owned top down telco controlled model where everything is run via central authorities like a vertically integrated railroad. Under such a model the demand for profit by those exercising the central control will stifle any further serious innovation. This is the current situation in the United States. It stands in stark contrast to the direction that Canada has just outlined for itself in its new National Broadband Task Force Report

We have argued before that locally owned infrastructure free to be run by local schools governments and research institutions with continuing innovation of the internet protocol and tool set is for the national and global economy in the 21st century what the interstate highway system was in the middle of the 20th century for the US. Tim Denton and Francois Menard two of Canada's leading netheads understand this very well.

What they enunciate below in a few short paragraphs is a description of why the internet is fundamentally different from the telephone system. This difference is overwhelmingly important and it is understood by almost no one in the United States where the libertarian fundamentalists have allowed the debate to be framed in terms of free market success and failure. The result is that the older, wealthier forces of the centrally top down controlled telephone system are in command and in control of access. In the US public policy is subsidizing the ILECs through the SLC tax to put schools and libraries on the internet. Public policy instead needs to be enabling community control through finding ways to make community ownership of local networks feasible.

For several years – especially in Canada the debate has been over open access to carrier owned facilities. In the United States this debate has rarely made it out of the barrel of specialist think tanks or lobbyist cabals. The debate has simply never reached the level of general public awareness. Experience has begun to convince those who have fought to define public access as mandate to be able to attach devices directly to carrier owned fiber that — short of a network of government financed inspectors and enforcers — access to facilities owned by others is simply unworkable. There will always be things that the carrier owner will do to favor its operation of its own physical media above that of everyone else. With facilities ownership the storied "level playing field" is a pipe dream.

The concept of customer owned networks is just beginning to come into

focus. Therefore it is not yet possible to point with certainty to any set of preordained outcomes. We may watch what is happening in Canada and see that more and more bandwidth at prices far cheaper than the carriers can provide is an integral part of the equation. Edge control and local experimentation will be enabled. For example, if a municipal network owns its own fiber, it will have its own set of customers who come to it because it will be able to provide a service of a kind that ILECs, carriers or IXC's find it uneconomic to provide. Customer owned lambdas more over will enable users to waste bandwidth and do things that are not feasible in the commercial world of companies struggling for enough customers to pay the interest on their bonds.

Such customer owned networks will have to provide their own operations staff and assume responsibilities that many other customers of commercial networks would not want to do. One danger of the current consolidation is that there will likely be fewer clueful local ISP staff to assist in operation of new local public network. Of course they could outsource to those local universities whose staffs have a clue. Unfortunately those universities are generally in Canada. In the US we have Internet 2. Like the schools and libraries corporation, Internet 2, in the name of subsidizing meritorious bandwidth usage, has primarily helped to offset the cost of high speed pipes from the traditional telcos. Research and development on spreading the deployment of broadband and making it cheaper has never been a serious concern within Internet 2.

At the most fundamental level, we maintain that public policy must begin to address the question of moving access to the physical network level. In other words it must decide how to deal with those entities wishing to build customer owned and operated fiber networks. Aside from the current severe problems of the industry, the motivator for these actions is the fact, as we have seen, that many of the private owners of buried fiber may not be able to meet the interest payments on their debt. It appears likely that we will offer a short window in

time to build a customer owned distribution and access system that will use new transport technologies not yet viable in the commercial network. We maintain, that we should take as our model something like the individual ownership model enabled by the federal home mortgage agencies. Yes, it *is* time legislative bodies in North America, Europe and the rest of the world to offer their citizens an alternative to the alarming concentration of media and transport that they have just given to the corporate titans. The US Congress has an opportunity to show the rest of us that it has individual constituents. It must build an insurance policy to maintain individual rights. It must recognize that small scale edge controlled publishing is in danger. It must realize that edge controlled entrepreneurship enabled by the rise of the Internet is in danger. It must show that it cares about small business as much as AOL Time Warner. If it is not to preside over the final demise of deeply held beliefs that the individual is sovereign, it must give the rest of us an opportunity to launch a lifeboat. It must ensure open access to physical rights of way and enable the edges to experiment with alternative models to the corporate Walled Gardens being built to fence the rest of us in.

It must do this because we made an important choice in this country for individual ownership and local community control of the important physical necessities critical to the local economy. For example, housing, cars, telephones and local highway systems. It has been our economic preference and it is a wise one, that individual ownership stimulates and local control generates far greater economic incentive and economic activity and much higher gross national product than does central economic planning at the national level. By far the more robust choice is to enable the end user to own and be responsible for as much of the physical system as is possible and doable. It may be that local stock companies arise in the way that local water and electric companies exist where only those directly served by the company are shareholders. In any case it is crucial at this singular window of opportunity to find the political will to empower our tra-

ditional American model of individual ownership and individual responsibility for as essential property as possible. It simply works out better in the long run for our national prosperity and social order. But, given that national and even international scope of the problem, action by our Federal government will be necessary to enabling positive community action.

The question becomes one of whether the government in the US or in Canada steps in with a policy to enable small businesses or local communities that want to buy fiber to operate their own networks to do so. We could design a national fiber bank set up to guarantee payments to cash strapped national fiber networks that sold fiber strands to local governments, schools, hospitals or even businesses that wanted to operate their own networks and interconnect with each other in the manner of the internet. Given that the government has enacted a four billion dollar plus aid package for the incumbent local exchange carriers in 1996 in the form of the national schools and libraries bureaucracy, it doesn't seem to be too much to do to ask it to make possible entrepreneurship on the part of local communities, including community ISPs. It can do this by taking the user taxes now collected from local communities and given to the new handful of mega ILECs and initiating programs that reward those who want to become entrepreneurs within their own community via the building of customer owned networks.

Doing this would not only provide a means of stabilizing the current chaotic market. Doing this would also set up a very healthy local market and resale structure of local communication networks and channels through local resellers who look to a federal loan guarantee and standards agency modeled after FHA or FreddieMAC, for instance. Very few would argue that local housing should be better served if sales and rentals were managed from the corporate headquarters of giant monopoly national and international corporations. By opening up the possibility of community control, would also help to ensure that diversity of telecommunications content is

maintained. The government would merely enable liquidity in the bandwidth and fiber market and in so doing would also enable continuing edge controlled innovation.

The Canadian's Understand

In Canada the Canadian government is completing the build out of the new highway system with a requirement of open access to fiber highways built at least in part with public money. Blind obedience to the idol of the "free market" in the United States is resulting in the exportation of leadership in the foundations of Internet technology to Canada. The short article below explains very clearly what is happening.

The Broadband Task Force Report Votes for the Internet

By Timothy Denton and François Ménard June 20, 2001

On the 15 th of January 1991, Tim Berners-Lee made the World Wide Web program free for anyone to pick up, and thus began the revolution that made the Internet a household word. He did not need the permission of the owners of the Internet to make it available for free to everyone. There are no owners of the Internet. Just like the English language, it is available to all who wish to use it. At its core, the Internet is an Esperanto for computers.

The most important fact about the Internet is that no one can tell you in advance what you can put onto it, just as no one censors novels before they are written. The creators of e-mail and web browsers, together with the web itself, did not need to ask anyone's permission. New music sharing formats (Napster and Gnutella) are out before the copyright interests can stop them. Being an open standard, a common language, the net allows new services because no one has to seek the permission of anyone to innovate. This openness presents a fundamental challenge to the legacy systems of telephones and cable television. They run on the principle that the owners of the networks

define what services are. They are highly specialized for a very few purposes, whereas the Internet is a general language enabling computers to communicate packets, without specifying what they are to be used for. No one owns that language; it is shareware. The best analogy of the Internet to the telephone or cable systems is the contrast between highways and railways. The owner of the highway does not determine, beyond very broad limits of weight and size, what shall travel on the highway. No one files a flight plan; you get on and off as you choose. No one exercise central control over traffic, with the result that there are crashes and traffic jams. Drivers coming on traffic jams re-route themselves. The same applies packets on the Internet.

Railways require central control. The path and movement of trains are centrally managed. The owner of the railbed owns the cars that travel on it, or has strict rules of interconnection with other railways to pass traffic. You cannot put rail wheels on your car and get on the track. The ideal of the railway, as with the phone system, is a completely pre-specified result: telephone calls go through. It is highly conservative to change because the whole is engineered for a narrow set of purposes. Not so with the Net. The chief fact enabling innovation on the Internet is that the owner of the transmission path does not own or control the vehicle (application) that uses it. This has allowed creators to innovate and people to select what will succeed or fail.

The National Broadband Task Force, which published its report a few days ago, had a choice before it: whether to extend the old model, or opt for the new, where the users of the network rather than the owners define what services will be. To their great credit, they have opened the door to the new model.

At the back of the report (<http://broadband.gc.ca/english/index.html>) is the key recommendation. It says that, for any build-out of a network employing government funds, there must be what is called "open third-party access", and more important, it specifies what is meant by that term. A third party is you or me, and by defining the terms on which

people can get onto the network, they are establishing the bill of rights for people to use the networks of the future.

Among those rights were: · The owner of the network cannot knowingly plan for a limitation in the types of services which could be offered to other service providers or end users; · End users could freely choose among different service providers; · Neutral meeting points have to be provided. (http://broadband.gc.ca/Broadband-document/english/appendix_g.htm)

This is the adoption of the Internet model. Open access permits innovation without permission. It stands as a remarkable advance in government policy. It puts Canada well ahead of the United States, where federal lawmakers are proposing to entrench the old model in a new telecommunications bill, at the request of the telephone companies.

There are reasons to think this Internet-friendly model could be thwarted. Canada has adopted open-access policy before, in the case of cable television, and four years later we have still made no real progress in defining what it could mean. In this case, however, there is reason for hope: with the right conditions set down from the beginning, new Broadband Task Force Votes for the Internet. It decrees that new networks can be built on new principles, and avoid the constrictions of the legacy networks.

Anyone who appreciates what a difference the Internet has made in their lives should encourage the government to implement this part of the report. The Task Force has voted for the future. Let the government know that the Task Force recommendations on open access have the support of people who use the Internet.

Timothy Denton (www.tmdenton.com) practices in telecom, Internet and domain names law and policy from his home base in Ottawa. François Ménard is a community network project manager at IMS Experts-Conseils in Trois Rivières, Quebec. Gordon Cook acknowledges many useful phone and net conversations with Francois Menard that helped to crystallize his thinking for this piece. He also thanks other reviewers who choose to remain anonymous.

Broadband in Canada

Enabling Local Control of Local Infrastructure

A Pragmatic Regulatory Approach to Enabling Community Fiber Networks and Commercial Interconnection

by Francois Menard

Editor's Introduction: This essay evolved in part out of a series of private exchanges with Francois Menard. Francois wrote this after completing a reading of the Canadian National broadband task force report. He reports that this article is really meant to inspire some action from those who will read the report, and say outright what is not being directly addressed by the report. He contrasts the current state of Canadian implementation for open access with what he sees as the next big challenge, the implementation of fibre optics to the home by means of community networks.

Although written from a Canadian perspective once again, Francois says that he has kept an eye open to make sure that nothing written in there was not directly applicable to US regulators.

He shared it with your Editor in the context reacting to various drafts of the "What Good is the Stupid Network, If the Other Guys Own It?" It has evolved to its present state partly as the result of a series of edits and comments between us over the last few days. Given the just released National Broadband Report, it is quite likely that Canada will see broadband being brought to every community within the next five years. It will be interesting to observe the resulting impact on Canada's economy. One thing seems certain: this infrastructure will be superior to what exists in the United States. Down here we need to become educated.

Dale Hatfield was quoted in BCR to the effect that the local loop may exhibit natural monopoly characteristics that have been exacerbated by the marketing and other costs of getting an existing ILEC customer to shift to an untried supplier and the difficulties that new entrants have had in getting collocation, access to unbundled loops, and interconnection agreements with the ILECs. What Menard convincingly shows is that, given intelligent use of regulatory power, discriminatory interconnections and unfairly priced rights of way do not have to remain undue barriers to broadband. Menard demonstrates how communities could force the aggregation of demand onto the same infrastructure. He illustrates why doing so will be a necessary precondition for any sound business case

for fiber to the business or fiber to the home. While local loop monopoly regulations have forced aggregation of demand in a way that sustains the PSTN, Menard shows how demand aggregation can be achieved on a fiber optic infrastructure without requiring that a utility be given a monopoly on services.

He argues that the necessary preconditions for broadband can only be truly realized when end-users can directly influence what equipment is attached to the infrastructure. Achieving this goal will require dedicated infrastructure, such as customers owning rights to specific fiber optic strands within the same cable. He doesn't discount the use of wave division multiplexing, frequency division multiplexing, time or code division multiple access or even optical packet switching equipment, but warns that any use of such technology constitutes what he calls "service-defining bottleneck facilities". He argues that owners of networks must mandate that physical open access be provided at the location of every such service-defining bottleneck facility. This is necessary, he suggests so as to enable other carriers to bypass such bottleneck facility, in order not to have imposed on them a certain type of service or business model. Regulators of the facilities based competition model are missing this point and are relying on what in fact constitutes discriminatory interconnections.

The architecture that Menard advocates would bring the fiber strand from the individual business or residence to the nearest carrier neutral co-location site where the owner of the strand could choose what services he or she wished to be connected to. The use of new technology such as high density ribbon cables and patch panels, micro-tubing and the ability to blow fiber through conduits would enable cost effective build outs. Investigation is underway to determine what the exact costs and best architectures are likely to be. The point is that in Canada there is now a regulatory impasse where CLECs have been given mandated access to unbundled network elements at discounted prices while they build out their networks. The discounts were to end within five years. However seeing that the objectives are not being achieved, the regulators have extended the discounts indefinitely - an act that deprives the CLECs of the

very incentive to build competitive infrastructure. In this essay Menard argues that it is time to throw out the current approach, adopt well defined standards of interconnection and encourage communities to act as freeees of equal access to their rights of way.

Just as it is seen as a proper and accepted role of government at local, regional and national level to set the rules for building and use of physical highways and the clover leaves by which they interconnect, so should government, from the community upward, determine the rules for building and interconnection of fiber based packet data networks. While the current system protects the interests of ILEC stockholders, it may only bring broadband "walled gardens" to most customers several decades from now. Menard contends that regulators are too busy with working the bugs out of regulations that are supposed to enable local competition in telephony. Consequently, they are unaware that they have the ability to ensure that we do not miss out on the opportunity, feasible today, of bringing broadband to everyone. What Menard describes is the technology and regulatory approach that will enable communities to extend fiber to government, schools and business, and then to homes immediately.

Note that eleven findings of fact summarize this essay on page 47 below. Readers are asked to study them before turning to Menard's essay.

An Essay Following the Release of the Canadian National Broadband Task Force Report

by Francois D. Menard. Send comments to fmenard@fmno.ca. Access the National Broadband Taskforce Report at <http://broadband.gc.ca>

One of the most interesting conclusions of the National Broadband Task Force report is that broadband infrastructure costs are much less than those of other

infrastructures (i.e. fibre optics can be constructed for 4% the costs of roads, 11% the cost of water systems and 15% the costs of electricity). I argue that this infrastructure should be built by local communities and should serve their interests. Much education remains to be done.

The business case for fiber to the business, or eventually fibre to the home (FTTx), equal access, and community networks, is being constantly challenged by telephone and cable carriers. This will happen as long as regulators remain unable to articulate a viable equal access architecture. It is the purpose of this essay to articulate such an architecture. Enabling such an architecture should become the center of telecommunications policy, as society gives more priority to broadband becoming an essential public infrastructure.

Regulations set to enforce PSTN competition have yet to deliver any real competition to residential users of telephony, let alone high-speed Internet access or broadband. Incumbents remain the winners of a battle where even more money is at stake than in the “Bellheads versus Netheads” confrontation. This new arena is the “incumbent Bellheads” versus “entrants Bellheads war”, — the introduction of competitive local exchange competition. The competitive local exchange carrier (CLEC) competition model has yet to be proven to be viable, and there is substantial doubt that its fruits will ever reach residential end-users.

Telecommunications regulators have long believed that facilities-based competition is the only form of viable competition. The Canadian Radio-Telecommunications Commission, (CRTC), Decision 97-8, which introduces local competition, says this verbatim, without providing any substance for its argument. The problem is that people have differing opinions as to what constitutes facilities-based competition. Furthermore, in the era of the Internet and broadband networks, what constitutes facilities and which of those are found to be essential is being redefined more quickly than competition can ever be implemented.

Why Facilities-Based Competition Has Not Worked

The first reference to what constitutes facilities-based competition can be traced to long-distance resale. More recently, enforcement of facilities-based competition has seen CLECs being required to co-locate their switches in central-offices and pay high prices for unbundled network elements under sunset rules (i.e. incumbents subsidizing competition for five years while entrants build their own facilities). However, seeing failure of new entrants to overbuild the copper loops of incumbents, regulators have recently extended indefinitely the sunset rules for near-essential loops until there is enough competition (CRTC Decision 2001-184), thereby also delaying indefinitely the incentives that CLECs would have to invest in new access network facilities for providing telephone service.

Looking at the last ten years of telecommunications policy, we can safely conclude that the definition of what constitutes facilities-based competition has taken on many forms. To a certain extent, there has been a logical progression from resale, to wholesale, to requiring competitors to invest in duplicating all but essential facilities, to forcing on incumbents the unbundling of near-essential facilities in order to subsidize competition and now to mandating third party access to higher-speed access services. This progression can be seen as an evolution toward more and more equal access to basic facilities and ultimately rights of way. The only form of wireline competition that exists today is between telephone carriers and cable TV operators, which have had years for investing in facilities before beginning to compete against each other.

What has remained a constant however, is that after ten years, there is still little to no business case for duplication of wireline infrastructure in a free market. With the rapid progress of fibre optics, it is certain that were one carrier to be first at building fibre optic to the home, and were non-discriminatory interconnections provided, market prices for such in-

terconnections would remain the only real barrier to entry. What constitutes non-discriminatory interconnections in the context of the Internet’s evolution to broadband will become the fundamental issue which will need to be overseen by regulators in the future.

In all but exceptional situations the market penetration of Internet access still only attains 30% to 40% the one of the PSTN. The penetration of higher-speed access services or broadband is vastly less. Furthermore there is still no agreement as to what differentiates higher-speed access services from broadband. While cable modem services are being called higher-speed access services by regulators in Canada, the National Broadband Task Force would be prepared to call them broadband for as long as they would be increased to speeds that are at least 1.5 Mbit/s in both directions (downstream and upstream).

Defining What Constitutes Broadband

However, to many organizations, qualifying high-speed 1.5 Mbit/s Internet access services as broadband is not appropriate. More specifically, many users would not feel to be connected to a broadband network unless they could control, through the connection of the equipment of their choice to the network, the services and throughputs that can be extracted from the network. For example, many school boards would not consider Gigabit Ethernet services provided by a metro service provider to be broadband, because such services would not allow them to improve the service at their discretion as the needs of their users increases and new equipment becomes available. With metro Ethernet services, customers cannot generally configure the levels of aggregation that is performed, have no control over rate limiting policies and are subjected to the carriers terms and conditions for packet classification and prioritization. These are all limitations which can be expected across the Internet, but when used across access networks, make it difficult for some users who understand what is possible to consider this to qualify as broadband. The allocation of lambdas to customers is perhaps the only alternative to

plain dark fibre services that can qualify as broadband, until such time as non-blocking, all optical lambda-pulse-switching becomes a reality, which is at best several years away.

However, we have seen that all forms of facilities-based competition that have been attempted to this date, whether resale, wholesale, CLEC or third party access, have yet to create a sound business case for overbuilding the PSTN or the cable television networks in residential markets. Even more troubling is the fact that the current regulatory regime discourages such possibility through the extension of existing sunset rule policies.

Over the last two years, we have seen many school boards in Canada acquire their own fibre optic community networks. Municipalities, which are perhaps the only other organization with requirements similar to those of school boards for connecting several buildings within a geographically-constrained area, are beginning to realize that they are perhaps the only other customer with sufficient market power to command the construction of new infrastructures. Recognizing this, many municipal administrations are collaborating with school boards in the implementation of community networks. Some municipalities are now considering leveraging this opportunity to accelerate the deployment of broadband to their residents.

Numerous studies are now elevating broadband networks to the level of essential public infrastructure in the new economy. A significant portion of the recent report of the National Broadband Task Force is given over to demonstrations of how broadband can empower new business opportunities, improve quality of life and create wealth in our society. As carriers continue to delay their commitments to deploy ubiquitous broadband networks and provide equal access to their facilities, municipal administrations become concerned with facilitating the business case for an equal access fibre optic community network under their own responsibility.

As broadband connectivity for all communities becomes as a national concern, funding of new infrastructures will no longer come solely from capital markets. One of

the main recommendations of the National Broadband Task Force is that "open third party access" should become a key condition to receiving any funding from the government. Therefore, as requirements for open access intensifies, carriers may realize that their current assumptions on how their "walled-gardens" will be financed by capital markets, will no longer hold. Under equal access requirements, carriers will not be permitted by regulators to determine their rates for interconnection by using proprietary content-connectivity offerings.

In proceedings leading up to current Third Party Access (TPA) regulation to higher-speed access services of cable carriers, (CRTC Order 2000-789), regulators have been lead to believe by cable carriers that this proposed mechanism for implementing competition (TPA) would not be discriminatory and would allow service providers to develop their own service offerings. However, these assumptions could not be further from what has actually happened in practice over the last 3 years. By restricting direct interconnections to their service-defining bottleneck facilities and through restrictive terms and conditions, cable carriers have chosen to limit their ability to innovate rather than to allow other service providers to develop a meaningfully different package of services. Although third party access could be different from offering at wholesale best-effort onramps to the commodity IPv4 Internet, cable carriers now specifically prevent competing ISPs from deploying IPv4 with differentiated services or IPv6 with security and integrated services.

More than five years in the making, regulation forcing cable carriers to allow third party access to their higher-speed access services will begin to be implemented in 2002. This will follow the approval by the CRTC of the outstanding rates for interconnection with other service providers scheduled to be filed by cable carriers, with the CRTC, by July 9th 2001. Canadian regulations surrounding the deployment of higher-speed access services of cable carriers is currently the most advanced in the world. Fundamental issues such as terminal to network compatibility over shared networks and what constitutes fair and proportionate use of a shared network are now being debated before the CRTC. The regulatory

course of action that will be determined as an outcome of these efforts is certain to influence how equal access will be provided on passive optical networks (PON) and point-to-point fibre optic networks, in Canada and elsewhere.

The large number of road blocks encountered by other service providers while seeking the implementation by incumbent carriers of third party access to their higher-speed access services is perhaps the ultimate reason why the introduction of competition originally called for either resale or pure facilities-based competition. We can now safely conclude from more than five years of debate and unsuccessful implementation, that open access can only be guaranteed by establishing equal access to the location of the physical layer (i.e. at the fibre strand, at the copper loop). For example, if we presume the existence of viable rates for unbundled local loops, had incumbent telcos never used digital loop carriers (DLCs), which limit the use of digital subscriber line technology, the number of consumers capable of selecting their service provider under physical layer equal access would be much greater.

An Architecture for Equal Access

Every carrier with a business plan calling for the exploitation of a proprietary "walled garden" business model knows that it is at fault for not providing non-discriminatory interconnections to facilities. The idea has been to force others into picking a specific business model were they permitted to interconnect beyond that facility. Perhaps the best illustration of such restrictions is again the case of third party access to higher-speed access services of cable carriers. Were competitors allowed to co-locate their own cable modem termination systems in the head-ends of cable carriers, and connect to channels allocated to the equipment of competitors, it would then be impossible for cable carriers to restrict others in their ability to compete. The cable carriers would simply subject them to the limitations of the equipments and policies used by cable carriers for their own higher-speed access services.

A great deal has also been learned from un-

successful attempts to use existing higher-speed digital subscriber line (DSL) facilities as onramps to a broadband Internet. From these lessons we must conclude that: (1) Were the infrastructure of the access network of the PSTN replicated with fibre optics, and (2) were customer-owned dark fibres back-hauled to a carrier-neutral meet-me point, and (3) were equal access mandated at each service-defining bottleneck facility (each DLC, each passive optical networking splitter and each blocking switch performing media access addressing and control), the result would then be a suitable onramp to broadband. In Canada the further construction school and municipal fibre networks under equal access provisions, with government funds, can be done with this kind of architecture.

For example, it would be in the interest of the public that city administrators carefully review current plans for deployment of very high speed DSL (VDSL) by incumbent local exchange carriers (ILECs). Municipal administrations will soon begin to receive from the telcos, requests to expand the size of the street-end cabinets to house new active VDSL access switches. Currently, telcos pay no taxes for the easement of land on which are erected street-end cabinets for the telco twisted pair cables. Adding active equipment in these structures would give the right to municipal administrations to charge taxes as if these structures were be mini central offices.

It would be contrary to the public interest to allow municipal administrations to grant such construction permits if equal access to these structures cannot be ensured. Furthermore, it is likely that the size of these structures will need to be increased substantially in order to accommodate fibre optic junction panels in addition to the existing copper panels. This will require joint planning with representatives of end-users who are now put in control over which entities may interface with the strands going towards their homes. Perhaps even residential micro-tubing support structures would ideally also terminate into the same structures. Such micro-tubing would allow end-users to blow their own fibre into what effectively becomes an equal access neighborhood PoP. With a programmable patch panel, it would make it possible for end-users to select from that point forward, onto which

fibre optic strand(s) their signal will be back-hauled to a carrier-neutral facility across the metropolitan area network. Finally, this could make it possible for cities to limit their involvement with residential end-users to one of maintaining a micro-tube support structure. Were the fibre to be cut, or become defective, the city would simply replace the micro-tube and the end-user could make an insurance claim to repay for another fibre to be blown from his home to the street-end cabinet. This way, cities could choose not to become carriers and to limit their activities to a business model which they know well, which is of managing public structures (roads, sewer, water pipes, etc.).

Regulators could eliminate a lot of market uncertainty by adopting immediately a consistent policy surrounding the conditions under which a carrier could operate a service-defining bottleneck facility. Such action would then allow new entrants wanting to invest in new facilities to avoid having to account for the risks of facing unfair competition from other carriers spared from having to provide non-discriminatory interconnections.

A New Opportunity to Implement Sustainable Competition

The migration of all telecommunications services onto a common broadband infrastructure provides a unique opportunity for the development of a real business case for competition in the telecommunications industry. In the beginning of PSTN regulation, the main objective was to force the aggregation of demand onto a single infrastructure, in order to lower the amount of subsidies required to fund its construction. The mechanism which governments employed was to subsidize utilities regulated as monopolies within limited operating territories. What has not changed since then is that there is still little or no business case for the operation of multiple parallel wire-line infrastructures for telecommunications. However, what is now different is that society now requires that prices not be set by regulators, but by free-market competition.

However it is critical to understand that the

development of any new policy or subsidy system making possible the construction and exploitation of new broadband networks still needs to account for regulations required to compensate for the inability of residential end-users to naturally aggregate needs.

Were regulators to have not permitted the use of facilities being built for a specific purpose through a specific license for operating a monopoly within a certain market, there would be no disincentive standing artificially in the way of a business case for another carrier to build an infrastructure for data services, for as long as there is a market for it.

However, telephone carriers have been able to convince regulators that it was in the best interest of the population to let them use their local copper loops beyond the purpose for which they were originally built for. Now, a couple years further down the road, we realize that there little to no business case for anybody else but the incumbent local exchange carrier to overbuild the PSTN infrastructure with fibre optics.

It would be much simpler for society to mandate that regulators ensure that LECs commit today to deploy equal access fibre optics residential networks. Otherwise, we risk the chance of wasting another 5 years just to realize that by then, the costs for deploying fibre optics access networks will not be significantly lower than today, and that there will still be no business case for anybody else but the LECs to overbuild the PSTN residential access networks with fibre optics. While the promise of broadband is within our reach today, regulators have no clear mandate to shift their attention away from working the bugs out of the implementation of local competition and worrying about how to ensure that broadband infrastructures get deployed.

What now appears to be needed from telecommunications policy are regulations which will favor the aggregation of end user demand onto a single fibre optic community network. But regulations must also explicitly mandate the disaggregation of services by enabling customer-owned physical-layer equal access onto carrier-neutral facilities. In other words every carrier can offer its own set of services while

being unable to prevent a competitor from offering a completely different set.

Furthermore, this regulation should call for municipalities to provide for the support structures necessary to customer-owned fibre optic strands under cost recovery principles similar to those of other municipal infrastructures. It is to be expected that some municipal administrations will be less interested than others in venturing into providing telecommunications support structures. Therefore it will be necessary for regulators to get an explicit mandate from the government to be able to regulate how cities are to be compensated when carriers are required to acquire rights of ways and build their networks should the municipality not be willing to do it.

Control of Physical Access at the Community Level

Those caring for the survival of the Internet as it is today will find it difficult to accept that its future may be the compromised by the outcome of a raging war between last standing incumbent and competitive facilities-based carriers. It appears that the surest way to ensure that the current connectivity-oriented business model of the Internet of today remains viable is to educate the parties that are in control the right of ways. Such parties must be in favor of equal access at the physical layer, as it maximizes the use of their structures when they have spare capacity and open access at higher-layers, as it minimizes the load onto their support structures when there little spare capacity. One of the objectives of telecommunications policy should be to monitor whether those users who receive service through open-access at higher-layers can get the same level of services than other users who can benefit from equal access at the physical layer. This requires that regulators monitor networks for bandwidth Quality of Service indicators in addition to the traditional service quality indicators.

For there to be a level playing field between new entrants and incumbents, there must exist consistent pricing for support structures and right of ways. For example, although the situation in Canada is much better than elsewhere because of CRTC

Decisions 95-19, 99-13 and 2000-13 (i.e. easy-to-get non-dominant carrier licenses making it possible to rent access to support structures of telcos and electric utilities at affordable prices), there are still some significant problems with current rates for poles. For example, the price rental price for the structure remains the same, 10 dollars per pole, per year, per cable, despite the number of cables on the structure. The existence of joint-use contracts between the electrical utility and the telephone companies gives preferential pricing to the telcos over their competitors.

A reform of rights-of-way administration has been called for in the report of the National Broadband Task Force. Regulators will need to keep in mind that several school boards have now bought into their own fibre optic networks based on existing right of way charges and that even the slightest increases in such right of way prices will compromise their future. Instead, power utilities should realize that it is likely that the number of people attaching to their structures will increase significantly (from only two, telco and cableco) to include several non-dominant carriers. It would not be contrary to the telecommunications act to require that electric utilities file economic studies in order to allow for the telecommunications regulatory authorities to ensure that prices for utility poles be recovered at cost plus a mark-up commensurate to those of other utilities.

Ensuring the Ability of Service Providers and End-users to Innovate

A new paper by Mark Gaynor, Scott Bradner & al. makes the case that the end-to-end principle of the Internet translates into a power to innovate. In an application rich broadband future, the ability to innovate is likely to become the essence of competition. Some consumers will strive to seek service from the most innovative service providers. Some others will prefer branded mass-market affordable services, while many others will seek free services likely to be financed by advertising and content bundling.

Few users realize to what extent they are buying into their own ability to innovate

while subscribing to Internet access. Many users do not realize that they may miss on the next Napster killer-application if they accept to receive content-oriented service rather than connectivity-oriented service. It is difficult to explain to end-users why they should pay a premium for a connectivity-oriented service unless they can quantify this kind of value. Academic institutions understand this, but then again, they have enough market power to purchase their own networks.

It appears that neither telephone companies or cable television carriers are prepared to offer better connectivity-oriented services and that all of their attention is now focused on bundling content and connectivity to that content. In this instance the free market is not working. Therefore mandating open access to all service-defining bottleneck facilities must become a prime concern for regulators. It appears that the introduction of customer-owned fibre optic community networks will be necessary for customers to ensure that they can still pay, perhaps more, to maintain their existing subscriptions to existing pure connectivity-oriented applications and to become eventually capable of making a high-quality videoconference across the Internet with end-to-end QoS guarantees.

Although the business models of the telcos and of the cablecos are likely to remain in full force within the largest markets, it is becoming clear that community networks will be the only way that will allow for new infrastructures to reach other geographic communities.

Truly broadband, equal access community networks over customer-owned point to point dark fibre can be implemented today. Many municipalities have become interested in leveraging the opportunity of being first to market with a connected community and are actively pursuing such developments. Ensuring the success of community fibre optic networks will require that telecommunications regulators refocus their priorities and consider what needs to be done in order to maximize the opportunity that is available today to reap the benefits of ubiquitous broadband connectivity for each and every one of us.

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Level 3 Communications: Smart People Have Designed a Flexible, Intelligent But Capital Hungry Global Build Out

Can L3 Find Enough Customers Quickly Enough to Support its Infrastructure Investment and Pay its Debt? Likely Yes Uncertainty Is How Much Infrastructure It Will Have to Shed Interviews with Ron Vidal and Rob Hagens Show a Business Model in Flux

Level 3's Market Position and Strategy - Your Editor's Assessment

Level 3 Communications Inc. is a very impressive company that may have made just one major mistake. It's *raison d'être* was to leverage the new fiber and packet network technologies by building a global infrastructure and becoming a global sales engine of highly cost effective transport to carriers and enterprises. Level 3 is finishing its very impressive global build out. Only Global Crossing can boast infrastructure in any way comparable. The mistake that Level 3 made was to build an infrastructure predicated on bandwidth growth assumptions that have proven to be without foundation. Consequently it has huge amounts of fiber and the ability to lay far more additional fiber than anyone else. It has also burned its way through billions of dollars. But without the explosive bandwidth growth it finds itself competing with all the other new fiber players to find enough customers to light its fiber and give it enough income to pay its expense and the interest on 7.9 billion dollars of debt.

"Why is this happening?" writes Sandra Borthick, technical editor of *Business Communications Review* in a January 2001 article at <http://www.bcr.com/bcrrmag/2001/01/p26.asp>.

"The simplest explanation is that, in the last several years, the number of facility-based providers has ballooned to more than 300 (just in the U.S.). Some of the newcomers are what Chapel Hill Broad-

band founder and broker Brent Wilkins calls "the usual suspects," national network startups like Level 3, Qwest and Williams, who have clearly multiplied the number of fiber miles many times over, at least along major routes. But, there are other, less well-known new nationwide participants, like Aerie Networks, PF.Net and 360networks, plus utility and transportation companies who own rights of way and conduit, plus regional and metro network builders and operators. Wilkins says pressures are mounting on the "usual suspects" to hedge against their original plans, stanch their venture capital burn rates and quietly part with some of their asset-based products: circuits, lit fiber, dark fiber, conduit and even rights-of-way. Some of these deals are far below retail, but "in the infrastructure market there is margin, and lots of it," he says."

In another article in the same issue < <http://www.bcr.com/bcrrmag/2001/01/p10.asp> > Peter Sevcik, president of Net-Forecast in Andover, MA writes "Another approach to estimating capacity is to count the number of OC-48 and OC-192 trunks in service by counting such ports on routers. Here I turned to Tam Dell'Oro, who I view as the most authoritative source for such numbers, and who told me that her research has found that the leading router vendors sold a total of 15,300 OC-48 and 100 OC-192 interfaces in 1999 and 2000. That is a huge installed base of very high-speed interfaces; only one-tenth of these interfaces would be needed in the Internet core to support all the current capacity, and clearly there are many additional OC-48 circuits outside the Internet core. The surprising result of this analysis is that

supply—i.e., bandwidth capacity—has been doubling every five months over the last two years. This is much faster than anticipated, and is alarming relative to the growth rate in demand. Something will have to change."

On June 18, 2001 *Communications Week International* published an article by Simon Dux & David Molony: "Level 3 signals European exit".

"Level 3 Communications Inc. is on the verge of closing its European operations and selling off its fiber-optic network, according to senior sources close to the company. The withdrawal from Europe by Broomfield, Colorado-based Level 3, expected to spend \$3.3 to \$3.4 billion in 2001 on its global build out, is one of the biggest failures in the European new telecoms sector to date." [Editors Note: Level 3 immediately denied that it was selling off its European operations. And as of early July the rumored sale of assets had not occurred. We surmise that what leaked was a contingency plan for its whole strategy of becoming EBITDA positive by the end of this year. For a day or so it looked likely that it would do whatever it takes. Including, if necessary, leaving Europe.]

Dux and Molony continued: "Earlier this year, Level 3 announced it would reduce capital expenditure in 2001 and said it was deferring the roll out of its planned 'European Ring 3.' The company said it was moving to prioritize shorter payback investments. and was aiming to become EBITDA positive during the final quarter of this year."

"The downturn in the dotcom sector and

the wider telecoms malaise has hit Level 3 particularly hard, according to sources. In terms of exposure, Level 3's business plan relied heavily on the continued growth of these Internet-centric companies. The company is on record as stating that 88% of its customers were communications-intensive companies, while only 12% were carriers and enterprises. One source said that many of the carrier's European customers have gone into liquidation. It is expected that Level 3 will re-focus in the short term on servicing a core of key clients." [Editor's Note: given Ron Vidal's emphasis on Level 3 as the carrier's carrier in the interview below but the absence of this marketing approach in the interviews of Andrew Morely (August COOK Report) and Rob Hagens below the apparent confusion makes sense as Level 3 in effect adjusts the face it shows to the world.]

The very next day however the other shoe dropped: Global communications service provider Level 3 said Monday it will cut 1,400 jobs across its global workforce. The company also cut its revenue projections for 2001–2002 and said it was refocusing to target more traditional enterprise customers. . . . The company now expects negative EBITDA for 2001 of 420 million. . . . Level 3 said it expects positive EBITDA of 200 to 250 million in 2001, and 850 to 900 million in 2003. The company said it expect to reach free cash flow break even in early 2004 (it previously predicted late 2003), and said it remains prefunded. Level 3. . . said it has signed 60 million in wave-length service contracts over the past 90 days."

<http://www.totaltele.com/view.asp?ArticleID=41101&pub=tt&categoryid=0>

As we shall see below Level 3 did a wonderful job of planning technology flexibility for a bandwidth hungry world that, given the telecom consolidation and rise of the corporate walled garden described in our introductory analysis is unlikely to ever arrive. The establishment of innovative edge controlled customer owned networks is likely to be Level 3's only ticket to salvation – unless that is SBC or Verizon, or Bell South decided it had enough stability to acquire L3 and pay

off its debt.

The Ron Vidal Interview

Editor's Note: Ron Vidal is Group Vice President for New Ventures and Investor Relations at Level 3 Communications, Inc. Previously, Mr. Vidal held similar positions at WorldCom, Inc. and MFS Communications, Inc., which merged with WorldCom in 1996. At MFS, he was directly responsible for the company's xDSL product line. He has held executive positions in network planning; engineering and construction; legal/regulatory; corporate development; and sales and marketing. Mr. Vidal started with the Kiewit Companies in 1983.

COOK Report: In view of the current situation, how do you assess the question of bandwidth supply and demand? It would seem that that a good part of the fiber boom that began in 1995 and '96 may have been caused by a belief that that Internet growth was on an inextricable curve of doubling every 3 or 4 months. But Odlyzko and others are beginning to conclude that this was a short-lived phenomena and that growth for the last five years is more on the order of a hundred percent per year. The Internet's demand for bandwidth is certainly insatiable but perhaps and not as great as we may have assumed.

Vidal: You raise the question of how do we assess bandwidth supply and demand? Do we have too much or not enough? In order to help us decide, let's look at how we got into the situation that we are now in. What did you have? Mezzanine rounds, IPOs, high-yield, convertible securities, senior bank facilities and vendor financing that was open to just about anyone 24 hours a day, for just about any asset class, for just about any terms and conditions up until March of last year. For the last couple of years, if you could do Power Point, yes you too could raise money. As a result of that where people usually viewed all management as equal and equity capital as free, you end up with the situation that we have inherited now, where a lot of capital was chasing just about every equity deal. Now it's all about whether you have

enough capital to run your own business without having to go back to the equity markets, which are now closed.

What you also had was a lot of people who announced fiber plans. Some in conjunction with existing networks some with new networks. How is one to assess those announced plans? We did an assessment ourselves only because we didn't see anyone in the investment banking or equity industry who, quite frankly, was ready to go out and understand what the implications of the interrelationship between capacity and capital was and is. We went out and made a chart. We took a look at all the backbone operators in United States. Our frame of reference for data collection and our universe was going to be public information because we wanted to understand what companies said about themselves in their own words.

We have used industry analysts' releases, webcasts, press reports, and web pages. We used open sources so that we would not violate any nondisclosure agreements that we had and so that any one who wanted to retrace our steps could. We came up with a spreadsheet. We listed all the carriers from 360 networks to WorldCom in column one. In column two, how many fibers you have? In column three, what is the capacity of the fibers that you have lit? The lit figure comes up with 13 terabits. Of course, this figure is a bit misleading.

COOK Report: Because the capacity depends on the optronics that are applied to the fiber doesn't it?

Vidal: That's right. It also depends on the length of the fiber lit at the given capacity. It costs very much less to light fiber at 13 terabits across the width of my office and that does the with the United States.

COOK Report: But without further qualification that figure is not very meaningful is it?

Vidal: We had to describe it that way because that's how companies report. Now when you say: "How much the capacity

Currently Funded Sources Of Bandwidth Services Supply

1 Company	2 Lit Fibers	3 Capacity (Gb/s)	4 Planned Fiber	5 Capacity ² (Gb/s)	6 Capex ³ To Light	7 Estimated ⁴ 2000 Capex	8 Adjusted ⁵ Capacity (Gb/s)	9 Years To ⁶ Light
360 Networks	1	320	35	56,000	\$ 34,360	\$ 795	5,600	39
AT&T	9	2,880	26	41,600	23,296	2,532	18,136	9
Sprint	5	1,600	15	24,000	13,440	1,646	11,712	8
WorldCom	6	1,920	18	28,800	16,128	2,165	15,436	7
Qwest	4	1,280	44	70,400	39,424	1,530	10,980	25
Global Crossing	6	1,920	20	28,800	16,128	668	4,724	24
Genuity	2	640	22	35,200	19,712	480	3,380	41
Williams	2	640	118	188,800	105,728	854	6,040	123
Broadwing	4	1,280	92	147,200	82,432	105	588	785
Level 3 (Internal)	2	640	10	12,800	7,168	2,600	18,584	3
Level 3 (Dark Fiber)	n/a	n/a	170	272,000	152,320	2,000	14,285	76
Total	41	13,120	570	905,600	\$ 507,136	\$ 13,375	95,180	38

Normalized 1 69 8

(1) Assumed fibers lit at 32 wavelengths at 10 Gb/s, as of Jan 1, 2000
 (2) Assumed planned fibers lit at 160 wavelengths at 10 Gb/s, as of Dec 31, 2003
 (3) At \$28 per Gb/s per mile. Assume average 20,000 route mi network
 (4) Estimated intercity backbone Capex based on public disclosures.
 Assumes Level 3 dark fiber customer Capex of \$2 billion per year
 (5) Adjusted Capacity at Dec 31, 2003
 (6) Assumes future annual Capex equals estimated 2000 Capex.

be you have?" (And this is the standard Wall Street question), we usually reply: "Where?" Suffice it to say that 13 terabits was what these companies said about themselves.

So we also asked what they said about their expansion plans. This will give you an indication of how much capacity they believe will be incremental to the 13 terabits they claim to have lit. The answer here was 905 terabits. In other words, they're announcing 69 times as much capacity to be lit in the future as they claim to have lit at present. We are talking here about the numbers of fibers that WorldCom, Broadwing, IXC, Williams Communications and companies like that have announced that they have plans to light. Well at 69 times as much capacity, of course there's going to be a glut. This is where most of the analysis stopped.

Now the fact is, even if I handed you the fiber for free, you would still have to spend a significant amount of capital to light it. Not to mention a significant amount of operating expense to keep it lit. And therefore we asked how much would it cost to light it all up? To answer this question we went out and took a cross section of prices on optronics from Lucent and Nortel and the usual suspects in the equipment business. We then simply did the mathematics. When you add up the results it comes to a whopping \$507 billion.

COOK Report: So people are promising that their respective companies will deliver what is impossible?

Vidal: We're simply taking these people at their own word. They've said we put this much fiber in the ground. If they were not going to light it, why did they put it in the ground? Next we assessed where are they going to get more than \$500 billion? Last year the high-yield market which was booming cranked out a \$120 billion. But this year, for telecom issues, I would say the figure is probably going to be asymptotically approaching

zero.

Said another way, I break down every communications operator into categories. You either have money, or you don't. You have money because you raised it, or you have cash flow from your own operations. Or you are looking for money. Now those companies with money certainly might plan to spend it on transmission equipment. Let's figure out what they spent on transmission equipment in the last couple of years and then calculate how many years it will take to light up that fiber at their current rate of spending — if, that is, that they kept their capital expenditure budget constant. The answer was an average for the industry of 38 years.

Therefore if the announced increase of 69 times in capacity were to be accomplished at current rates of expenditure, it would take \$507 billion and 38 years. Clearly this will not happen, and if it will not happen, one might ask where is the assumed a glut of bandwidth? Therefore I would suggest there are a couple of large barriers that stand in the way of turning raw glass into a glut of bandwidth.

Corning Strategic Partnership

I could fly up to Corning tomorrow. Once there I say to Wendell Weeks who is president of Corning's optics division: I want 10,000 km of Corning's next generation of fiber delivered. They now have completed their technology transfer. We now have title to the technology that Corning developed. We now own the spool and the contents of the spool. The biggest deterrent in boiling this down into capacity consists of two things. First of all, there is a gigantic construction effort that you have to make in order to get it in the ground. That construction effort will be a recurring expense every time you want to add another cable.

Construction costs you every time and

has no silicon economics associated with it. You don't get more trench for the same amount of dollars every 18 months. This is why we believe the foundation for success rests upon just-in-time fiber and being conduit rich.

COOK Report: Please elaborate on which you mean by just-in-time fiber.

Vidal: We have one strategic partnership and that is with Corning.

COOK Report: So in effect when Corning is ready for the rollout a new generation of fiber, you have first pick of the new product?

Vidal: Yes. We also have the ability because of our conduits to make fiber available faster than anyone else. One of the things that we did when we started the company in 1997 was to look around and say if you're going to build a new network, how should you do it? Should you do it differently than the way networks were built 10 years ago or 100 years ago? We decided that before you could answer that question you had to start out by saying what is the technology today and what is its road map into the future? That is to say where were ASICs, DSPs, fiber, opto-electronics, and routers going?

COOK Report: And how do you get the most cost-effective paths of transition into those technologies as they become available?

Vidal: That's why the roadmap is so important. I think a lot of people might sit there and say well we will just continually add more capacity by adding more lambdas. There are companies which will open up the L band for example to put more capacity and existing fiber.

COOK Report: And the L band is?

Vidal: There are three bands within the 1310 to 1550 nanometer range: the L band, the S band, and the C band. All opening the L band does is give you the opportunity to layer in more wave-

Figure One - Opposite page: This is the chart that Ron Vidal discusses in the above text on page 14 and page 16. Having not done the research ourselves, we cannot vouch for the findings. Certainly it would seem to give useful information about the relative investments of the largest players.

lengths. And the L band has a particularly difficult set of physics associated with. It's spectrum area is the area most is susceptible to attenuation from hydrogen. Of course hydrogen is a building block of water and water is what you find plenty of underground.

In the L band, attenuation, dispersion and polarized mode effects all have an impact on how far you can send a signal without having to regenerate it. Also affected are the number of wavelengths you can run and the line speed of the wavelength. All of which boils down to cost.

Maintaining Technology Flexibility

Therefore we said that, if you look at technology today and all of its components that are relative to building an optical network, and if your goal was to give yourself the luxury of maintaining, in your design, every possible degree of freedom over the course of the next couple of decades you might get to a better outcome for yourself than if the network were designed for nothing more than changes in opto- electronics.

The second thing that we looked at was the state of our competitors. What was their roadmap? What would they have to do if they wanted to get on to the same kind of inter-generational cost curve that we were on? What assets to they have and how are they going to be able to compete - given the state of the capital markets? What is a state of the capital markets? Not only now but at some time in the future? We saw a point at which the capital markets would constrict. And now they have done so. In fact we finished our \$5.4 billion jumbo offering of common stock, high-yield bonds in euros, and convertible securities in February of last year, a month before the Nasdaq fell over. We then had our cash at a time when everyone else thought of the markets as a 24 hour a day convenience store. And now, more than a year later, it seems that we're in the middle of weekly bankruptcy filings.

COOK Report: So here we are with the

situation where you have a wonderful infrastructure, a collection of really smart people, some good ideas but you have a considerable debt -

Vidal: \$7.9 billion.

COOK Report: Then is not one of the critical issues that you are facing how you can make sure that you can continue your infrastructure build out while at the same time having enough incoming revenues to pay the interest on your debt?

Vidal: You are, of course, asking the critical question. Here are some basic facts on the company. We have \$10 billion in network, plant, and equipment that is less than 2 years old. We have about \$4.5 billion in available liquidity. This boils down to \$3.8 billion in cash money at the end of the first quarter of 2001. This is no promise of cash; it's real money in the bank. The difference is important, as WinStar found out from Lucent. And another \$650 million in an undrawn a line of credit. We have \$7.9 billion in debt and had \$858 million in communications revenue last year and this year our projections are for \$1.3 billion in communications GAAP revenue and \$2.1 billion in communications cash revenue.

COOK Report: Would you explain those two different revenue figures?

Vidal: The different figures are caused by an accounting rule. The first figure is \$1.3 billion that is booked according to Generally Accepted Accounting Principles. The other figure - communications cash - is higher because it includes up-front cash we take in from the sale of dark fiber but which we have to recognize gradually over time under GAAP.

Let's take an example to explain how works. Say we sold you dark fiber for \$100 million. You give us the first \$25 million when you sign the agreement. And you give us the other \$75 million as we deliver the segments of fiber to you in our network. Let's say this all happened within a single calendar year. We would take \$100 million in for the company. We would call that \$100 million in cash revenue. But because our customer takes

this and amortizes it as a 20-year asset on its books, we will account for the \$100 million under GAAP as only \$5 million a year over each of the next 20 years. This is the best kind of revenue we can get because we get all the cash up front. Which means that there is no downside. That there are no disconnects and there is no credit risk

Identifying Competitors and Customers

Think about everyone who has aspirations to run a network. Or to exploit new geographic territory. For example, in your neck of the woods, Verizon. We could take every one of these companies and breakup their territory into on the net and off net. From the northern border of Maine to the southern border of Virginia, and everything except for SBC in Connecticut, a couple of Contel locations in New York and Camelot telephone in Pennsylvania and a couple of GTE exchanges, everything is on net to Verizon. What is off net to Verizon is the rest of the world.

COOK Report: So when Verizon or another ILEC wants to get to the rest of the world, you are positioning yourself to offer them the single most cost-effective means of doing so?

Vidal: Exactly. As a carriers carrier we are a company without a sales organization competing heavily for retail customers with those of our customers. We do sell to enterprises occasionally, especially those that operate their own networks, but our focus is very much on the top 300 bandwidth customers around the world. And we think we're unique in this position. For example Qwest, Broadwing, Global Crossing and Williams Communications through its alliance with SBC have all said that they have a renewed focus on selling to enterprise customers. But that territory is also the territory of AT&T, Sprint, and WorldCom. These companies are all potential competitors of each other as well as customers. We don't think that these kind of mixed roles make for good business partnerships.

If someone is going to come to us and say we would like to buy this kind of capacity especially in these kinds of volumes, the chances are we have some control over where a fair amount of that capacity originates and terminates. So if you are Sprint, and I'm Level 3, and Arthur is Qwest and you say I need to buy some wavelengths, or SONET rings or some fiber that goes all the way around the United States my first question is going to be well exactly how much you want to buy? And where should we pick it up and where should we drop off? This means it to have to tell us a fair amount about your own network. Where your customers are. Where your interconnects are. You have to let us inside your buildings.

COOK Report: So these other carriers will have to look at their own networks and decide where they're thin on capacity; how much it would cost them to light new capacity and whether it would be more cost effective for them to do so or to go to you and outsource to you the service and they need for their customers. Is that what I'm hearing?

Vidal: That indeed is what you're hearing. So let's say you go to the market and you hear people from Qwest give you their pitch and from Level 3 give you our pitch. We would sit there and say: look not only do we have a good cost structure for you today. Just take a look at our own network assets and you tell us if it makes sense for you because you also may be interested in how you're going to make the inter generational technology jumps for your own business. We have a pathway for you to do this. We would also say to you that no matter to whom you decide to outsource this, you will have to tell them a fair amount about your own internal network business. The problem is that every one of the guys you compete with, is also out there right now trying to compete for your retail customers.

The third thing that we're going to tell you is that we will give you a built in hedge position. Since we have a bunch of conduits, we have a lot of flexibility both in our intercity networks in United States and in Europe and in our metro

networks. You could buy wavelengths from us today and you could put your own SONET equipment on them or you could plug it right into optical interface cards on Juniper routers, Cisco 12,000s or gigabit Ethernet switches or what ever you wish. Or you can buy SONET services from us today and hand us a whole bunch of DS3s or work out for yourself a technical interfaces on whether it is an electrical add drop or an optical add drop. However what we can offer you that no one else can is that, if you decide that you don't want to buy service anymore, we have a built-in hedge for you. We will sell you a conduit into which you can pull your own dark fiber. Oh, you don't want to own the conduit but you do want dark fiber? We have a ton of dark fiber and we can make it available to a lot faster than anyone else out there., both in the long haul and in the metro.

COOK Report: So what are the details of what you offer and the lengths of the contracts?

Vidal: Lambda's come in two flavors – 2.5 and 10 gigabits. And of course nothing outside of equipment availability matched up to the right kind of fiber with the right kind of economics limits us from offering 40 gigabits at some point in the future.

COOK Report: The 40 gigabits would have to be either OC 768 or some flavor of Ethernet probably 100 gigabit Ethernet? And the thinking is that at some point of the future we will have either of those and maybe even both?

Vidal: Correct. If you talk to Nortel and to the component manufacturers, to Corning or to JDSU you will find some plans underway. Right now there are questions about the SONET framers for 40 gigabits, as well as limitations on bus architecture and how these people will spin up custom ASICs necessary to do the job. The component level, and particularly at the component electrical level, is where the majority of the heavy lifting has to happen in order for 40 gigabits to become real.

If you were talking about buying lamb-

da's from us, we would say show us your network map and show us where you need the capacity. Even if we have a good price, there's no point in doing anything if you have to drop it off at Fargo, North Dakota. So given the availability of infrastructure, we will say to you tell us what you need, what time frame you need them, where it goes, what the demarcation points are on each end, and what's is the Interface that you want? Either 2.5 gigabits or ten-gigabits? The lambda would be a fixed amount of bandwidth that is not ring protected.

Or you may be protecting at the IP layer and could care less about SONET. If you say that you'd like to take it on a one to five year contract, we can accommodate you. Or you might say: you know what, I'd like to take these wavelengths, pay for them all up front like an IRU and book them on my balance sheet as an asset. We can accommodate you there as well. You can either pay for all up front or by the month on a yearly contract.

COOK Report: And if I wanted to see how this pricing might change over time, you presumably would have some spreadsheets that would show me .

The Telecom Supply Chain

Vidal: Yes and there is also going to be volume driven price - how many do you want and where they go? Now remember that we have a partnership with Corning. One reason this is so important is that we sit down with them at the earliest planning stages for new generation of fiber and we tell them what it is we anticipate needing. And that is a situation where our customers telling us helps them. Otherwise what you have is bunch of product planners and managers sitting in the same room and saying gee I wonder how much those guys at Level 3 are going to want and hearing: Gee I don't know. What we've begun to develop here is a supply chain for our communications and we think that is very important. I just find it amazing that in a telecommunications industry that has been in existence for almost 130 years a supply chain of the kind that has developed in the last 20 years in

computing has never developed.

Instead, in telecommunications the vertically integrated mindset still tends to predominate. Of course it's really only during the period of the last decade that there has been really any competitive telecommunications industry. Only with the advent of competition in long haul and with competitive local exchange carriers has there really been any attempt at competition with the monopolies.

The monopoly guys sit around and say what do I need price elasticity for? Why do I need to plan for the next two technology revolutions? Consequently the deal was that you never had to develop a supply chain in telecommunications because the monopoly has all the traffic anyway. So now, as much as we would like to sit down with Corning and say: here's what we think is happening; here are the appropriate lambda spacings and line rate per lambda; we need first to sit down with the companies who have off-net aspirations in United States and Europe. It is very important for us to sit down with these players and understand what their own roadmaps for their own networks look like. This is not a drive by lambda sales here. We want to sit down with them and say, "Hey what do you think your needs would be if the lambda were a thousand bucks? What would they be if it were 10,000 bucks? Or finally suppose it were only hundred dollars?" You would get a three really different answers.

COOK Report: As use of lambda's increases what are some of the technology changes that we may expect to see? For example customers running an optical border gate way protocol and things like that? The Canadians are saying that one of the lessons of the Internet may be to teach the telecommunications world that carriers are no longer necessary.

Vidal: I think carriers in the traditional sense of billing by the transaction and putting out detailed bills for very small increments of traffic aren't needed. It depends on what your definition of a carrier is. Our view is that a carrier is someone who owns the underlying infrastruc-

ture.

If we look at the seven layers of OSI protocol stack, customers used to just deal with layer 7, the applications layer. Now to my mind, it is a matter of economics as to whether the customer wants to own all the way down to layer one or only part of the way there. It could be dangerous to generalize how customers will behave because there are so many different kinds customers. Said another way, does not the price of dark fiber have some elasticity attached to it which causes an economic incentive for a particular kind of behavior? For example, if that dark fiber were hundred thousand dollars a mile, no one would own it. If it were \$10 a mile, everyone might own it.

Improving the Economics of Transport

Right now, you have three major components of information technology. Processing, transport and storage. It looks to me that information processing and storage have had 20 years of dramatic price performance increases. Transport has had only modest improvements by comparison. So the debate now is should we have centralized storage or should we put caching servers all over the face of the earth. Faced with this dilemma, the first question I would ask is how much does each alternative cost? There is, after all, a substitution mechanism between the cost of storage and the cost of transport.

COOK Report: And faced with what is essentially a trade-off, one company with a given network infrastructure could get one answer to a given problem while another company with a different network infrastructure could come up with a very different answer to the same problem.

Vidal: Exactly. So if storage is cheap and bandwidth is expensive you go with caching. If bandwidth is cheap and storage is expensive, you put all your storage in Omaha, Nebraska and backhaul it to all places where it's needed. When I first started in telecommunications with MFS, we were going to go offer competitive dial tone to the RBOCs. Once again, if the cost of

switching is cheap and bandwidth expensive, you do distributed switching. If the bandwidth is cheap, and switching is expensive, then let's back haul every local call to a big gigantic switch on cheap real estate in Omaha, because we cannot afford switching, but we can afford bandwidth.

Said another way, we think that bandwidth is now substitutable for storage or processing. Now because bandwidth can be substituted at will for storage or processing, we are on the cusp of seeing significant price performance increases in bandwidth capability. If we look at the amount of performance you get from the optical components from Corning or JDS or what used to be Etech or SDLI, which are now all JDS, you are getting a doubling in performance of the same dollars every nine months. Now arguably Moore's Law has had a 20-year head start on processing, but at those kind of rates, there's nothing that we have been able to find which has a faster price performance increase than optical technology in industrial history.

COOK Report: With his performance increase in mind, what do you think will be the big application that moves people to 40 gigabits?

Vidal: All the people I deal with these days on Wall Street seem to have but one question. They say, tell me: what is the killer application? In answer I say I don't think it's going to be just a single killer application. There is a great study that University of California Berkeley, School of Information Systems and Management, put out. They did a study that EMC paid for. Looking at public sources, they came to the conclusion that there would be more new information created in terms of exabytes in the next three years than in the last 300,000 years.

Now one of the killer applications I think simply is email. Why? Because email has turned out to be a very easy and convenient addressing scheme. Forget about the fact that I send you a friendly greeting. What is becoming more and more significant is that I use email as an addressing tag for attachments. Now remember this

is on the demand side. What I think you're going to see with bandwidth that is substitutable for processing and storage, is that you are simply going to have to let the market figure what wants to do with those capabilities. Now even though my friends on Wall street like to hold themselves up as predictors of the future, I ask them at every conference: who predicted Napster? The answer was no one. So on the demand side, I think that if you make things affordable for people to do, they will indeed do them. Now it sounds like I am taking a leap of faith here, but four years ago it would also have taken a big leap of faith to imagine getting to our total of 610 billion emails a year.

When you look at 40 gigabits is four times as fast 10 bits and wonder what's going to be out there to soak it all up, you need to look at the fundamental economic shift involved. When we went from two and a half G to 10 G, our last platform shift of 400%, the increase in cost was only two and one-half times. Consequently people said there is an economic advantage to going to 10 gigabits. Even though we don't know what the economic drivers will be that will soak it all up, going to the higher speed will lower the current cost per bit of our transmission capability. That is the kind of platform shift in technology and in network economics that we expect to see in going from ten-gigabits to 40 gigabits.

COOK Report: Making this transition looks to be more difficult on the OC side than on the Ethernet side. Do you agree or disagree?

Vidal: I am intentionally not saying OC 768 because I'm not sure that SONET will be the appropriate framing mechanism for 40 G.

OC768 and The Fate of SONET

COOK Report: So what is the fate of SONET at this point and the evolution path for it?

Vidal: Lots of companies have tried various schemes for private line circuit emulation over the years. People were talk-

ing about doing circuit emulation with ATM. They were talking about doing circuit emulation with FDDI. Which is another way of saying we'd like to sell the customer what he believes to be a fixed amount of bandwidth while we, the network operator, get the benefits of statistical multiplexing on our side of the ledger.

COOK Report: But might it be more economic to run four OC-192 s as opposed to one of OC 768 ?

Vidal: You are now hitting on a central point for anyone who wants to run a network. It is simply not a matter of saying I think I have OC 768 and therefore I will have enough capacity to handle whatever. A more appropriate question though is the one to which you pointed. Namely what are the underlying economics for the various choices that I have?

I will tell you that we have a group of about 30 people out in Denver. It is something of a skunkworks operation for us. It is called our Project MAX team. It's a group of operations research people with a couple of economics Ph.D.s. We are facing inter platform technology and economic shifts. The good news is that we're going to have a lot of choices. The bad news is that if you do it wrong you're going to have an opportunity to make a lot of bad choices.

For example when we began our network and started off with 96 strands of fiber, we did not have to bet the farm that 96 was the right number because with 10 other conduits open and available to us and we have preserved a lot of optionality. Then we say of the 96 that we pulled, we will only reserve 12th for ourselves. We're only installed one particular set of equipment in this case Nortel OC-192, 16 wavelengths and now going to 32 wavelengths. Our goal was to get a network up and running.

Let's say we got eight SONET rings out there at 320 gigabits per ring. The real question then becomes, when we need it, how do we turn up the 321st gigabit? We continually must look at what the right set of technology combined with the right set of economics is so that we can leverage to maximum effectiveness what we

have invested over the last three years.

COOK Report: Isn't this in part why a lot of people would say that you ought to be going after that 321st gigabit with Ethernet instead of SONET?

Vidal: That's correct. If we look at the economics of GigE in the local loop, we'll find that it has the opportunity to predominate because in convergence of three fundamental themes. First, in packet business has now gotten large enough so that you don't have to carry legacy time division multiplexing traffic in order to have a viable business in the local loop. Back when we were at MFS we had a general purpose multiplexers in buildings because you did not know if you're going to get analog modems, digital modems, T1 s, DS3 s, frame relay or what. There was a veritable alphabet soup of protocol interfaces to choose from.

Point No. 2: there is enough dark fiber so that operators can string it together and go and hook up their customers. You do not have to own you own plant as does Telseon, Yipes, and Sigma Networks, Cogent, Looking Glass etc. You guys, if things go wrong out there, can buy dark fiber from us, and or Metromedia network and or electric utilities. There are guys like City Net who are running fiber through sewer pipes in Omaha.

Preserving Flexibility in the Infrastructure Business

Point No. 3: There's now gigabit Ethernet switches that allow you to go about 60 km without having to regenerate your signal. Put those three things together and look at the unit volumes for electronic manufacturing in Ethernet. Compare those volumes to SONET and you will find that Ethernet wins hands down. The ability to get high-speed Ethernet bandwidth in the local loop will change things dramatically. SONET boxes don't have enough unit volume to really drive their prices down. Ethernet boxes do. Consequently, as we make the inter-generational leap, we are not even sure right now what the right set of technology in-

terfaces happens to be. What we do know is that it may be different than what our past selection was.

Consequently, what we do have are many different choices for making that 321st gigabit. Choice number one we could burn up fibers 5, 6, 7 and 8 in our first conduit and install on these four fibers exactly the same kind of Nortel equipment. That would give us a second set of dual SONET rings. Choice No. 2 might be to turn up 5, 6, 7 and 8 of the first cable in the first conduit and use someone else's equipment, maybe Sycamore, maybe Corvis, maybe Ciena Corestream. Maybe we would not even use SONET. Option number three. Forget about Cable number one and put in cable number two, turn up fibers 1, 2, 3, and 4 and put SONET rings in at OC 768. Option number four: turn up fibers 5, 6, 7, and 8 and put in some kind of a hundred gigabit Ethernet. As an engineer, I cannot hardly answer a question about an inter-generational leap in technology until you tell me when you think the leap will take place.

If you tell me that you have to have that 321st gigabit today, I have a limited number of choices. If you tell me that you need it by May 30, 2002, I have a whole different set of choices. If you need it five years from now I have a whole bunch of other choices. One of things we like to do is preserve options. So why bet long? We like betting long on things that don't change very often. For example, underground conduits. We like to keep our powder dry for things that change all the time, like anything that has optics or silicon in it.

So as we think about these inter-generational leaps, we think about what the most effective way to accomplish them is. We like the idea that we can implement new sets of fiber faster than anyone. Faster in time namely years and cheaper in cost namely by hundreds of millions of dollars. The next conduit cable we pull in we can probably do in six months and about 50 million bucks for every 12 fibers.

COOK Report: Distinguish please the

details of your fiber infrastructure. For example cable versus conduit.

Vidal: The bundle of conduit is now installed over 16,000 long-haul miles in the U.S. and roughly 3,600 mi. in Europe. For all this we have 12 conduits that are each one and one-quarter inch in diameter. One cable fills a conduit but each of the conduits we have the flexibility to decide whether we will install a two-fiber cable or a 1,200-fiber cable.

COOK Report: or to pick possibility out of the thin air you could put in a single cable with 12 fibers. Correct?

Vidal: At our option that is correct. The goal of our operational planning was to make sure that we did not do anything that painted ourselves into a particular corner. Rather we have made sure that we have every possible option open down the road. For example, we must make sure that we have enough floor space. Therefore every 100 km along our right of way we have bought 5 acres of land. What else do we need? Well we need enormous amounts of power. We need lots of raised computer floor space in major cities. Power reliability is getting more and more important. We must put in a robust power infrastructure in order to make sure that our servers don't go home at 5:00 at night.

COOK Report: Not to mention the repeaters and amplifiers in your network.

Vidal: They are continuous duty cycle machines that demand high availability.

COOK Report. If you lost power, that would be the same thing as a fiber cut.

Vidal: Absolutely. So take, for example, our data center in New York. It is one of several that we have in the New York metropolitan area. One in Newark, one in Weehawken, one on Long Island, two in New York City. 111 Eighth Avenue is a very large building occupying an entire city block. It was originally built as a garage for the Port Authority buses. 76th Ninth Avenue is in the other side of the building. We have a presence there and a presence at 60 Hudson. A block

away from the 111 Eight Avenue site we purchased, an entire building of some 550,000 square feet. The building is roughly 50,000 square foot per floor. It is open. We have put UPS and battery backup on every floor. We have 14 diesel generators on the roof. One for each floor, a spare, one for the chilled water system, and a spare for it.

COOK Report: Are you telling me that you do this sort of thing through out you network?

Vidal: Everywhere. We store something like 37,000 gallons of diesel fuel at that site in New York. We store something like 250,000 gallons of water at the same site. We have contracts with suppliers that will keep the trucks backed up to keep the tanks full and the reason we have so much water is that, should we ever get cut off from the city water supply, it will be needed to keep the chillers in operation. This is what you have to do if you are in it the infrastructure business. It is why we think it is so important to understand what exact business you are in today, and not try to be all things to all people. If you try to be good everything for everyone you may wind up being not really good for anyone.

COOK Report: That makes a lot of sense, Now where exactly does softswitch fit into what you've told me? To what extent is softswitch a weapon in the convergence wars?

Softswitch Strategy

Vidal: A little background first. In doing our planning we asked what our hedge should be if data traffic did not grow as fast as we anticipated it would. Now in our mind there is no doubt that data traffic is growing much faster than voice traffic. Doing anything in the voice area, however, takes longer to develop. When we started the company, we initially began with the idea of developing the equivalent of a client server emulation of a class four interoffice switch.

When you think about circuit switches, you need to understand that they're basically proprietary hardware and propri-

etary software. They run on closed operating systems with no open application programmer interfaces and without any third-party software development.

One key things about Softswitch is that we separate control from the media. In a circuit switch, the control of the switching of individual lines or trunks is all and bundled up in the same hardware so that the control layer is intimately tied to the media. Now Softswitch sets up a separate control path in the client server architecture that it can be used to control a DSL line if you want it to. It does not have to control 64 kilobit, or the equivalent of analog voice circuits.

COOK Report: What would be the total range of things that Softswitch could control?

Vidal: A lot of things. It is a control mechanism independent of the underlying media being controlled.

COOK Report: So basically it can control any kind of bit stream?

Vidal: Yes any kind of a bit stream. At Level 3 we're now running it as a Managed Modem service and scaling rapidly. Eight billion minutes of local dial up traffic every 30 days. And that's up from zero minutes two years ago when we began. Some people looked at us then and said: oh you're running some kind of Heath kit toyware that will never have the reliability of the circuit switch. The fact is we now have some gigantic customers would put significant portions of their traffic on our Softswitch network on a day-to-day basis - namely America Online and Earthlink.

COOK Report: I heard a figure quoted of driving the monthly per port cost down from \$15 to \$3.

Vidal: Correct. If that is not price elasticity in action, I don't know what it is. Remember when the dollar price per port was 70 to 100 bucks a month you have to keep a bunch of customers on each port at 19.95 a month to make a profit.

Now let me suggest another thing to

think about. You mentioned the expectation that this nebulous thing called convergence would result in the swallowing of the public switched telephone network. I'm having a hard time seeing how this happens. Right now you have a contraction in the capital markets but there are still a hundred million discreet households in the United States. These will require an enormous amount of rewiring. The new players simply don't have the capital to do all of this.

COOK Report: From that point of view I understand. But aren't you looking for the day when an SBC or a Bell South will come to you and be ready to outsource voice minutes?

Vidal: Remember that in their own territory, there is no need to do that because they own all the infrastructure.

COOK Report: But I had the impression that even though they own the plant property and equipment, it could be more economic for them to run voice on newer more cost effective technology.

Vidal: Don't forget how they built their network. How their network gets depreciated, and how their rates are set is vastly different inside their service territory than outside.

COOK Report: In other words regulatory and accounting issues within their territory then override decisions about pure technology cost?

Vidal: Yes. Remember that they will be an incumbent inside their territory and a CLEC outside their territory. The model here is to watch how the incumbents have moved in cellular both inside their own territory and outside. And they behave differently because of the economics and the accounting.

With the current generation of Softswitch, when you think about it for a second, modem based calling is a proxy for local voice. Now this time next year if your operating system includes a SIP client like Windows XP, it lends itself to an always on connection. If you had DSL on there you would presumably be

using local loop copper wire. Softswitch would setup the signaling for the remainder of the call. Because we separate out control from the underlying media, we acquire lots of flexibility as to what the underlying media can be.

That is one of the reasons that there is a native IP version of Softswitch. For example right now I'm talking into a handset that is going back to a PBX where it is being converted from analog to digital, it's going out on a T1 on AT&T's network. This does not have to happen that way. There's a lot of action in the voice-over IP space and there is a handful of people who are working on equivalent Softswitch technology to emulate Class 5 or end office features. This may either happen as a direct placement for Class 5 machine or it may happen as a piece of a kit that sits on a customer's premise, will do the analog voice-to-digital encoding and then convert it through an IP stack and take voice-over IP packets that you would the want to have some amount of quality of service some probably using MPLS to give those voice packets priority through your network.

Now we have not developed a Softswitch that does Class 5 emulation. We developed our own Softswitch that runs the managed modem service through an acquisition of a company called Xcom Technologies a couple of years ago.

We do not have any plans as Level 3 software and hardware platforms to make a Class 5 end office switch taking the functionality of a mainframe and putting it on to a client server that we would then call a Softswitch. I simply don't see us doing a bunch of software development for a Class 5 Softswitch. Not the way we did software development for the class four managed modem based Softswitch. We would look to a Nortel or Lucent or a Cisco or a whole bunch of other people in the International Softswitch Consortium who are taking on various parts of this. We might run, as a service provider, what they developed, but we would not develop it ourselves.

COOK Report: To the extent then that you can integrate into your overall infra-

structure the technology that other people provide, you would do that? And to the extent that integration can enable you to handle more and more voice traffic over IP you are prepared to do that?

Vidal: Yes we are.

COOK Report: what do you think convergence between voice and data may enable you to do over the next year or two? How can these developments enable you to put together a package that proves even more irresistible to legacy carriers as someone to whom it would wish to outsource their needs?

Vidal: I think that there will be numerous layers of outsourcing and that the first place that people will look is the transport layer. I think we have an unmatched position at the transport layer. As the ILECs decide how they're going rollout voice, and whether voice goes the way of local dial tone or goes as voice over IP and whether that native voice-over IP is transported in the local loop over DSL line or a cable modem line or some other kind of provisioning we are in a pretty good position there from a Softswitch perspective to support those applications as a service provider.

Maybe I was a bit unclear and when I said: When we first developed Softswitch for management and services, we had to develop the basic hardware and software for the machines and then sell the services. We developed and launched what is now known as the International Softswitch Consortium. The last time I looked there were over one hundred paying members the consortium. Members receive preference specifications for software protocols especially MGCP and SIP. The way we see it is that there's enough of a market out there now so we do not have to go and development of these things of scratch. Our internal Softswitch is what is carrying our entire managed modem service today and that is performed beautifully.

COOK Report: But to really swallow large chunks of voice traffic still left on the public switched network or to enable that voice traffic ride your infrastructure

cost effectively other hardware and software Softswitch simulations will have to be developed? Are they being developed?

Vidal: Yes and the good news is that they are being developed. Ike Elliot, the head of our softswitch services group, could speak you about what specific companies to doing what specific activities.

COOK Report: Do you then look at Softswitch as just another weapon in your arsenal that you can offer potential carrier customers in your efforts to present yourself as best equipped to play the role of the carriers carrier?

Vidal: I don't think I would call our position insurmountable given the pace of change in this business today the best you can hope is a head start and I do think we have that. You might want to ask where is intellectual capital going? And where has financial capital gone?

I will say that a lot of intellectual capital is going into Softswitch style services. We are ready to front of that. And a lot of financial capital has gone into building some kind of platform network and we have a really unique position there. Why? Simply because the capital markets have dried up and with all the discussions that people are having, I don't think there's going to be any support for any new network to be built at any time in the near future. The amount of capital required for such a platform network as ours is very great while the mood and sentiment in the capital markets is very poor. I think that we are in a holding period while people are looking for a basis on which to rationalize this entire industry. Whatever the case Level 3 as a company is not going to stand still.

The Rob Hagens Interview

Editor's Note: Robert Hagens is Sr. Vice President, Global Architecture at Level 3. He is responsible for Level 3's global network and systems architecture. Prior to joining Level 3, Rob was Director of Internet Engineering at MCI Telecommunications Corp. where he was responsible for the architecture and engineering of

MCI's Internet backbone service. Additionally, he was one of the original key architects who created MCI's Internet backbone from scratch. We interviewed Rob on May 30, 2001.

COOK Report: Let's dive right in. Please explain the architecture of your optical network in some detail from a technical point of view.

Hagens: Our transport network is really divided into two parts. The metro networks and the intercity network. Over time the distinction between the metro and intercity networks will be blurring.

COOK Report: And what is causing the blurring?

Hagens: The blurring is driven by the need to be able to deliver wavelength products (lambdas) to customers who are located not only at our co-lo facilities where our intercity networks interconnect with the metro networks, but also to the customer premises itself. Doing this requires our metro networks to transport wavelengths as well. The least cost way to extend a wavelength to a customer premises off net would be to be able to switch it straight through and not have to go through a process of regeneration at our gateway between our intercity and Metro Networks. Let me come back to this in more detail in a moment.

We have fiber in 26 metro markets in North America and nine in Europe. In those North American metro markets we have run a significant amount of fiber between our gateways (our hubbing sites within the city) to other interesting places which can be carrier hotels, ILEC Central offices, and specific buildings that we have targeted overtime. We have in those locations a very large amount of fiber. These metro markets are then interconnected by our intercity network in North America. [See network maps.]

We are running the same technology in the U.S. and in Europe on our intercity networks. 32 wavelengths at 10 gigabits per second. Those wavelengths are connected to gateways at which point they go into different kinds of equipment the

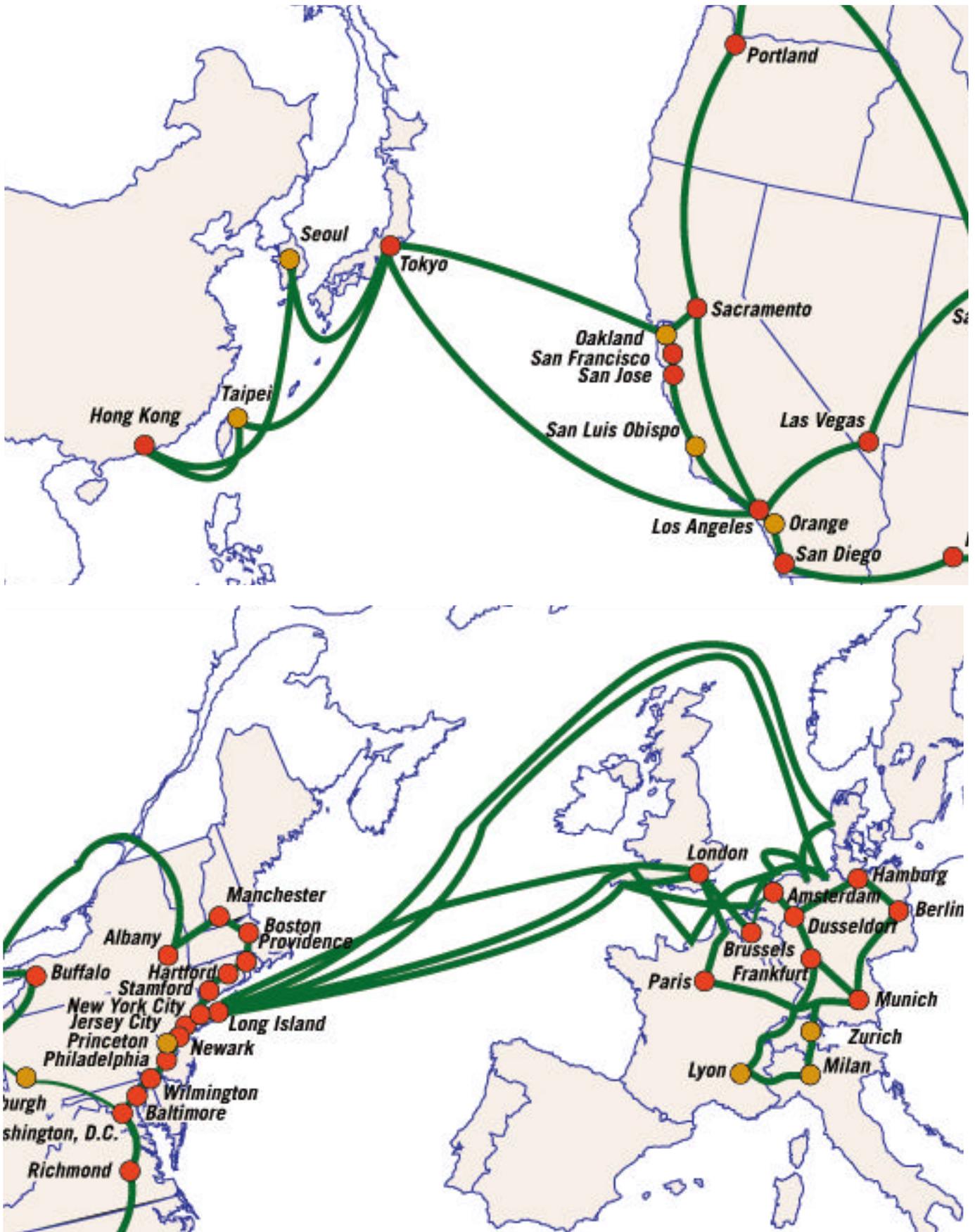


Figure 2: Level 3 Network Maps of Asia and Europe

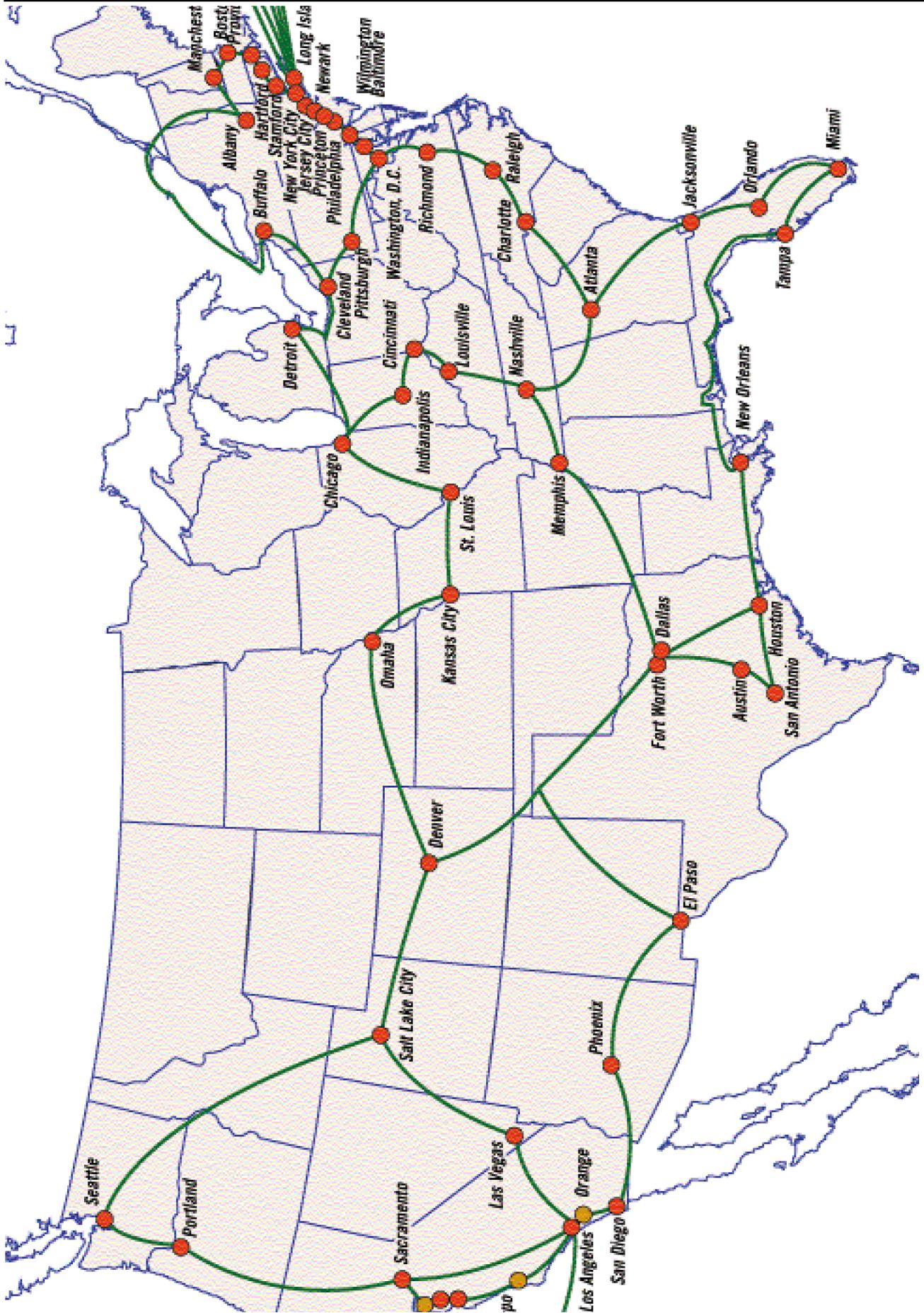


Figure 3: level 3 Network Map US

depending on what kind of service we want offer.

COOK Report: And the equipment you're using? Nortel I believe? What are the devices and "flavors?"

Hagens: We are using Nortel but I don't know that we have announced the exact devices and model numbers. From the WDM part of our network, therefore we have unprotected wavelengths coming into our gateways. Some customers are interested in buying an unprotected ten-gigabit wavelength. In such a case we simply patch the lambda that's coming into our gateway over to the customer's equipment if they are co-located with us, or we route it out over a metro fiber to their building if they're not.

Now if the customer is interested in OC "n" kinds of services, those wavelengths would go into add drop multiplexers which provide the SONET functionality. Our fiber network is divided into rings on all our spans as well as having unprotected wavelengths on all our spans. This is how we would sell our traditional private line service. Finally, some of our bandwidth is routed into cross connects which allow us to sell lower speed services such as DS3.

COOK Report: And that digital cross connect would do what is sometimes referred to as grooming?

Hagens: Yes. And so that is really where we are at this point in time with our transport network. Our submarine cables come into cable stations where they get back hauled to gateways where the capacity is then made available to any of the services that I've so far described.

COOK Report: From a technical or inter-operability point of view, what do you experience in transiting from your intercity networks into your metro networks?

Hagens: We have run into no significant issues there.

COOK Report: In other words at layer two, the optical transport layer you have been able to select all the necessary

equipment to, in effect plug and play all the way from your intercity into your Metro networks?

SONET Versus Ethernet

Hagens: Yes. Let me come back to your earlier question about SONET.

COOK Report: OK. I have certainly gotten the impression that a carrier like AT&T with a large imbedded base of voice traffic is tied into the use of rather costly SONET in a very major way. Now, to the contrary, I had assumed that a green field player like a level 3 would make much less use of SONET which, for the transport of data, is both expensive and inefficient in comparison to voice. So how you do what you do with SONET in a way that achieves maximum cost effectiveness?

Hagens: Let me start my answer to that question by talking about the metro environment for a moment. In the metro area, we run SONET over all that fiber that I was describing to you because we have lots of customers who happen to want SONET as an interface. They will take private line service from a point on one of our metro networks and route that across our intercity backbone to another point or points on our metro networks. But in the metro environment we also run Ethernet directly over fiber. There are a number of CLEC start-ups out there who are doing this, but we find this to be very cost-effective. We put Ethernet equipment in either the customer building or co-location hotel. We also have Ethernet equipment in our Gateway. We use it as an on ramp to our IP backbone.

We are very bullish on Ethernet. If you look at how this improved over time - something like six orders of magnitude over the last 28 years - you won't find anything else with that kind of performance improvement. Moreover, because it is everywhere, it is generally a lot cheaper than any alternative solution. We see Ethernet evolving into the intercity network as well where we will be using it directly over lambda's within the next year or two.

Just imagine the possibilities raised by, instead of having to plug into in a lambda with an OC-192 card, being able to plug in with a ten-gigabit Ethernet card at a fraction of the price. We think that Ethernet is the wave of the future and certainly are very bullish about it.

COOK Report: Are you saying that you are doing your engineering to accommodate to those who want SONET to but to make everything else provisionable in Ethernet?

Hagens: Well, as an experiment wouldn't it be interesting to look at all the OC "n" private line circuits that we have and peak inside the SONET payload and figure out how many of the SONET frames are actually running Internet protocol. Obviously, for privacy reasons, we would not do this even if we had the technology to do it. But we certainly believe that a lot of the traffic that's going over our private lines ultimately, somewhere upstream, in fact becomes IP. IP is what is growing most of the edge of the network so it makes sense that if you can move to an Ethernet based interface and transport mechanism that can support IP, you should certainly do so. I think that is where we will be in the future.

COOK Report: What has to happen to get us from here to there?

Hagens: We need a completion of the standards and of the necessary optics and and then a maturation of the early products and their installation in the network. But in the long run now we believe that our future will be built on our ability to maintain the lowest unit cost for bits delivered over our transport network.

Architecting Intercity Network for Cost Effective Electronics

When you build an intercity network, the electronics is by far the dominant factor in your cost. Electronics will amount to about 95% of what you must spend. And, if you look at the electronics, the thing that has the dominant cost there is your regeneration card. Now when you send an optical signal out over the fiber, it

starts to degrade due to dispersion. You need to be able to correct the signal. There are two ways of doing this. One method is to do an optical reamplification where you shoot more light into the existing light in a very special way such that the signal is rebuilt. However, amplification introduces noise. Therefore you can only get away with doing this so many times before the signal to noise ratio is at the point where, if you go much longer, you won't be able to recognize it with the precision that you need to. At this point the only alternative is electrical regeneration where you translate the optical signal into an electrical one. And then after the electrical regeneration, you send it out anew with a laser as though it were sent for the very first time. It is this electrical regeneration process that you must do every once in awhile that is really expensive.

Now when we built our network we have had a lot of ideas and a lot of money but no real-estate. We had the option to choose in deciding how much distance to put in between each regeneration site. This is called spacing in your transport network. What we chose was 100 km spacing for amplification and 600km spacing for regeneration. This means that our signal travels for six of these 100km segments or a total of 600 km before it regenerates. We have to our knowledge the only network with regeneration spacing that long. Most of the other networks out there have spacing of much less than 600 km.

COOK Report: So you're saying that because of this your intercity and transport cost is very cost-effective?

Hagens: Yes. You want to buy as few of those re-gen cards as possible and we achieved this by spacing them as far apart as possible. We also pushed very hard on our vendor (Nortel) to be able to do the re generation with a single card in order to keep costs down further. Many companies out there today supply regeneration systems where you basically have two cards. A receiver card that is in turn connected to a transmitter card.

Some other contributing factors are that our entire network is running at 10 giga-

bits. A lot of the transport networks out there today are lit at 2.5 gigabits and not 10. We are effectively running four times that 2.5 capacity for only two and one-half times the cost of the 2.5 capacity. We chose to light at 10 gigabits because the 10 gigabit equipment had just come onto the market. In effect because we have just finished our network we have been able to light it more cost effectively than those who finished their networks earlier than we (Level 3).

Now if you look into our situation with conduits you will find out that there is a critical linkage between upgrading our network to a new generation of fiber and the cost of regeneration in the core of such a network. All the variables really have to be taken into account. Now the shorter your spacing between points of regeneration the more lambdas you can squeeze out of the fiber itself. But you have to have more equipment over all to do this. Therefore it is likely to raise the cost beyond the benefit derived.

There are more and more varieties of fiber. Including one that looks like it will perform especially well at 40 gigabits. If you imagine that the 40 gig systems will deliver the same pricing dynamics as the 10 gig namely four times the capacity at two and one half times the cost and that you can improve things still further by running and on fiber ideally matched to 40 gigabit requirements you will be able to get a tremendous cost advantage over all the guys out there who are running only 10 gig systems. And remember that because of our conduits we could pull a new national fiber network through a new conduit in approximately six months time.

Softswitch

COOK Report: So from a technical point of view where does Softswitch fit in?

Hagens: OK and let me describe then from a generic point of view a softswitch. Imagine what a circuit switch is. You will find that on the one side it has a bunch of line cards that face the customers. On the other side you have a bunch of trunk side cards that face other switches. In the middle you have a

switching matrix. Something that is a not very high-tech crossbar matrix. And then sitting on top of the whole thing, you have control software that controls the switching and controls things like setting up a DS zero from an incoming line interface to an outgoing trunk Interface and also interfacing with the control network of the public switched telephone SS7 network. Now in the traditional circuit switch you have something like 30 million lines of proprietary code. You buy the whole thing from a single vendor and have to pretty much live with the vendor's legacy development time lines were things are slow-moving and the cost improvement rate is very slow.

COOK Report: And at a cost of several million dollars per switch?

Hagens: Yes. Therefore what we've done is taken the control section of the switch and instead of running that and on a proprietary piece of hardware, you run it on a general-purpose computer. For example a UNIX box. The line cards and the trunking cards basically turn into stand-alone pieces of equipment. And then the switching matrix in the middle, you must replace with an IP network. This is what happens when you install softswitch. Now you have a number of things going on. The software runs on a general-purpose computer which enables you to take advantage of Moore's Law for system upgrades that would otherwise be much more expensive. Line cards and the trunking cards get replaced by what we call gateways.

You design this whole thing so that it works on the standard protocols. You do this so that you can go shopping for your vendors and have vendor A's line cards talking to vendor B's trunking cards while shopping all the time for the lowest price. IPDC, the IP device control protocol is actually the protocol that we're still using. MEGACO is several versions into the future and can be thought of as the ultimate standard.

COOK Report: You put together an IPDC consortium of people. Therefore you have plenty people to buy equipment from?

Hagens: That's correct and this, compared with the traditional circuit switched alternatives, has given us a tremendous cost advantage. Our Softswitch ports are definitely cheaper than circuit switched ports .

COOK Report: So your Softswitch is a combination of software and hardware and it's not entirely software?

Hagens: That is correct. But let me add what I tend to refer to as the "Softswitch" -overtime - is really just that control box that I told you about. We call the line and trunking Interfaces "gateways." And the network connecting it altogether is an IP network. The control point is what we call Softswitch.

COOK Report: Where in your network are the Softswitches located?

Hagens: They're located in about half a dozen gateways connecting our network to the PSTN.

COOK Report: In other words where you interconnect with the plain vanilla PSTN? Or with other IP operators or both?

Hagens: It is not so much where we interconnect because we have them distributed within a number of different Level 3 facilities. We distribute our VOIP gateways throughout 25 of our markets. The softswitch hardware and software is deployed in a subset of these markets. In the remaining locations where we interconnect with the PSTN, we backhaul the circuits to one of those 25 markets.

The Softswitches then communicate over our IP network to these gateway boxes which provide the interface between our voice over IP world and the PSTN. We have a huge number of these gateways scattered around not only North America but also Europe. On the one side they connect to the incumbent local exchange carriers and in other places they connect to off net carriers who are providing termination services for us to specific countries into which we do not have termination facilities. And in other cases the gateways actually connect into our voice

customers.

With the Softswitch concept we were able to launch a product called managed modem. This is a modem wholesaling service.

COOK Report: Where does managed modem service fit in your overall use of Softswitch? Are AOL and Earthlink your only major customers?

Hagens: We have a lot of significant customers and do approximately 8 billion minutes per month of connect time for managed modem services through a platform of distributed Softswitches.

COOK Report: And so from my home office in New Jersey, I would dial into the Earthlink pop in Princeton. And even if I were in AOL customer I would probably dial into the same set of phone numbers. There I would login to your server where you would receive my login and authenticate me to the appropriate Internet service. From that dial in pop to the gateway of the service a PPP session is then established? My packets are multiplexed and load balanced with those of countless other users and if you don't have a port for me in Princeton your network can establish a connection for me somewhere else? Except for the call from my house to your Princeton New Jersey pop, my Internet session completely avoids the public switched telephone network?

Hagens: We have trunks into end or central offices and to tandems so, depending on your situation, you would be going from your house into the Central Office. From that Central Office, especially in a significant metropolitan area, we would have direct trunking to a modem bank using the Softswitch gateway function that I was talking about. It would be at the modem bank where the call is terminated and data is sent over our IP network.

COOK Report: But what are the other things that you do with your soft switch services?

Hagens: We offer voice termination

services so that a customer may order a DS3 and run circuit switched voice-over it terminating at one of our gateways. We will then take all the calls that come into us and complete them. Either on our network directly or we will hand them off to another carrier to complete. We simply call this SS 7 termination service. We also have customers that connect to us via PRIs. We are their long-distance provider . They will send calls to us and we will terminate the calls for them. We are also able to take calls into our network via IP directly.

SIP and QoS Issues

Now remember that customer with the DS3 that was handing us calls in a switched environment? We can now have that same customer and take a direct IP connection into our network by using the signaling protocol called SIP (Session Initiation Protocol).

COOK Report: I'm told that Christian Huitema has put a wonderful SIP client into Windows XP at Microsoft.

Hagens: SIP is certainly emerging as the standard signaling protocol and is likely to replace SS7 over time. When we hand calls off between our soft switches, we do it via SIP which also serves as a signaling protocol between Softswitches. This is what we're doing with Softswitch in the voice area.

COOK Report: Do you have any minutes per month figures on the voice applications?

Hagens: No I don't think we've released any of those numbers yet.

COOK Report: One of the biggest arguments against a voice-over IP is so-called quality of service issues. How are these issues handled within the Softswitch world?

Hagens: We have built an IP network that can support multiple qualities of service. When we launched Level 3 several years ago we had an IP network running on top of an ATM core. We have now nearly completed our move to an all

MPLS based network. We have MPLS the switches at the core of our network in the United States, Asia and Europe. We are running MPLS between the two continents as well. With MPLS we're able to create a plane that is a higher level of service and than our standard Internet. This plane, from a security perspective, is completely isolated from our own ordinary IP traffic so that there is in no way that the Internet bad guys can go hack into our voice backbone. We take this higher-quality voice-over IP plane and use it to interconnect the Softswitches and the gateways.

At this point in an there is no magic out there. You just have to capacity plan appropriately so that you don't run out of head room on the network. There is a contrasting approach and this approach is not what we use, but you will see a lot of people trying to do signaling to set up a QOS path on a per call basis. This means that they set up a flow of across the network for every call. In wWe don't think this is the right way to do it. We think that it is better to have a general class of service and that, if you want to be protected, have us route your traffic as part of that class.

Operations Systems Support

COOK Report: Would you speak to the issue of Operations Systems Support? I gather that it is something near and dear to the hearts of the ILECs. I gather that one of your Holy Grails would be to get someone like Verizon or SBC to sign a deal with you to provision an off net infrastructure for them globally, in other words, a long-distance network. And furthermore that blending their OSS requirements into your Softswitch Systems would be a critical requirement for such a deal. And one finally that one of the reasons that Buddy Miller was brought from Bell South as executive vice chairman was the assistance that he can give you in these areas? can you say anything about this?

Hagens: Let me try to take your questions one at a time. OSS is basically Operations support systems. It is also

known as BSS or back office support systems. All this is really a generic term to refer to a collection of software that is used to run an enterprise. The difference between the O for operational and the B for back office is that the B systems are generally billing systems. OSS then is the term for software systems that automate the following kinds of activities: customer care, provisioning, configuration of equipment, activating service on a piece of equipment, fault monitoring, performance monitoring and so forth. All of this software together is lumped into a category called OSS.

COOK Report: I also thought it could refer to the capability of an ILEC to bill a for a time to long-distance call from point A to point B.

Hagens: It could. It could refer to just about any kind of software that is needed to support a telecommunications companies front office business. For example, something we sell offer called ONTAP is a piece of our operational support system. What it does is to enable real time circuit provisioning in our backbone of OC'n' kinds of services. It, and an order entry system by the way, is another example of an OSS system. What ONTAP permits us to do is go from a customer order to a fully provisioned circuit in a matter of days. The actual turning up of the circuit itself only takes a matter of minutes. The extra time is for validating a bunch of stuff on the front end and making sure that the circuit tests clean on the back end.

COOK Report: Say that I'm ordering an OC-3 from San Francisco to New York. There would be some sort of back office paperwork that would presumably occur in making sure the purchase orders are there and the people have found the physical connection points and so on? Once all this is done, how does the actual turning up of the circuit happen?

Hagens: We have a set of cooperating pieces of software that will make a running decision on how the circuit should be routed across our network. The software will then go out and communicate with the pieces of equipment all across

our network and coordinate events on each piece of equipment in a reliable fashion to effectively turn up the circuit from point A to point B. It all sounds pretty complicated but in actuality once it's been programmed you can do it again and again and again very quickly.

COOK Report: AT&T speaks in terms of designing an intelligent optical transport network. From the point of view of your network what does this mean? How would you describe your own design? Finally where are you going with your network design and how would you contrast yourself as green field players to someone like an AT&T?

Hagens: This goes back to what we talked about at the beginning. Namely that we spent a huge amount of energy trying to plan for the unforeseen because that is what kills the cost base of telecommunications companies. That's why we have conduits. That's why we have the spacing along our backbone the way we have it. That's why we have a huge amount of flexibility in terms of the kind of equipment we put in our gateways.

There are probably a hundred different knobs that we could turn in the overall equation of optimizing our transport network. We have only talked about a few of them. There is spacing. There's line rate. There is the kind of fiber. There is how many channels you run. There's a question of dealing with SONET or some other kind of protection scheme.

These suggest the obvious issues. There are some very large number of less obvious ones. What we've done is left ourselves the ability to be able to engineer the most cost-effective and most efficient network. This is why we're so sure that we will have the lowest cost network in the country. This is basically my job. I am responsible for architecture and have a whole bunch of people working for me. And I don't get my bonus if I don't have the lowest cost network in the country. Intelligence is like the word OSS. It is a very broad term that can mean a number of things to a number of people.

Customer-Owned IP Networks

Completing the IP Revolution Through Customer-Owned Networks - an essay by Timothy Denton

Editor's Note: The following is an excerpt from a 12 page paper: "Customer-Owned IP Networks — Completing the IP Revolution Through Customer-Owned Networks – April 2001. the url to retrieve the complete paper is: <http://www.tmdenton.com/pdf/Customer-ownedNetworksv1.2.PDF> The first half of the paper is a useful discussion of the differences between the Internet and telephone and cable networks. We republish with Tim Denton's permission the second half which is the best concise discussion of customer owned networks and condo fiber builds and pricing that we have seen.

A New Kind of Network

The combination of technical incompatibilities, and the owners' resistance to becoming open platforms for communication by third parties, has led innovators to consider establishing new kinds of network. In Canada, Sweden, the United States, and Holland, various entities are experimenting with new legal and commercial approaches to networks. The principal reason why these new models are being developed is the rapidly declining cost of the technologies employed.

These ownership structures allow the end user to have rights of use in a portion of the network. The customer may jointly own the network as a part of a condominium, or a neutral party, such as the municipality or local government, can install and maintain the network, while the users own shares in it. The patterns of ownership and rights of use may vary, but all such arrangements transfer power over the use of the network away from a centralized owner, and vest it with the users. This is revolutionary, in the same sense that the personal computer tore power away from the mainframe, and put it on everyone's desk.

The technical advances upon which

these networks rely are well known. Bandwidth capacity is doubling every four months, while computing power is doubling every 18 months. Dense wave division multiplexing (DWDM) allows for customers to own and control wavelengths. Ethernet is coming to be the accepted standard protocol for wide area and local networking, allowing networks to function without the costly underlying strata of SONET and its like.

Developments in protocols are also helping the transition to customer-owned networks. OBGP (Optical Border gateway Protocol) will allow customers to manage their own wavelength routing and extend their network domains. This will allow direct connection and peering with other network domains attached to the network cloud. Bill St Arnaud, head of special projects at Canarie Networks, says "OBGP is being developed to push control of network administration and peering into the hands of as many of the smaller players at the edge of the network as possible."

The development of customer-owned fiber networks, with gigabit and terabit capacity, will undermine the traditional carrier business model, which is built upon managed network services, and carrier-owned infrastructure.

The regulatory regime plays an essential role. People must be able to obtain carrier licences easily, and they need to be able to exercise rights to attach wires and cables to the poles and conduits of the incumbent carriers, for reasonable prices. The innovation here is principally legal and regulatory; the technology cannot be made to work if the regulatory barriers make it too expensive to try.

How the New Network is Designed

These networks have four characteristics that differ from legacy telephone and

cable networks:

- Customers own and control their wavelengths, and may trade them with other like-minded customers.
- The network is an asset, not a service.
- Creativity is derived from the end users, not the network managers.
- The core of the network will not be optimally designed to minimize resource usage when end users have control; it will waste bandwidth.

Legal and Other Arrangements

The particular legal arrangements among owners of the rights of way, owners of the fiber, and the entrepreneur who organizes the project are as various as people can make them. There is no one plan or pattern.

Municipalities or other governments can build the fiber, assume the risk, and lease out the capacity as Indefeasible Rights of Use (IRUs). Or, tenants can band together and hire a private contractor, or the private contractor organizes the consortium.

In some cases, universities and research organizations can act as the "anchor" tenants. They have expertise in LAN (local area network) technology. Fiber is installed, owned and maintained by third party professional fiber contractors. Each institution gets its own set of fibers, at cost, on a twenty year IRU (Indefeasible Right of Use).

Engineering firms can organize a consortium, aided by a federal carrier licence, which gives them leverage with the incumbents, to join or be left out. The telcos and cable companies get their own strands of fiber for much cheaper than they would by building alone, so they join. High telecom prices (based on incumbent cost structures) make it profitable for institutions to take advantage

of the offer made by the organizer of the condominium.

Each customer-owner lights their fibers using their own technology, Gigabit Ethernet, ATM, PBX.

The condominium model is a combination of private ownership (strands of glass or lightpaths) and public utility, through municipal or provincial participation in financing and rights of way. In some ways it resembles a public utility, like water, sewerage, roads and firefighting. The conduit may be public, but the lightpaths are privately owned. The analogy of private cars running on public roads might come close, but here the conduit can be owned by a municipality or by the condominium of users that paid for it. It can be thought of as facilities-based competition, fiber by fiber.

Market Drivers

The factors making possible these customer-owned networks are: First - low cost. Up to 1000% reduction over current telecom prices. 6-12 month payback. Second - The local area network (LAN) invades the wide area network(WAN) - no complex SONET or ATM is required in the network. Third - The new arrangements enable new applications and services not possible with traditional telecom service providers. No managed services are provided by anyone. Fourth - These arrangements allow access to new competitive low-cost telecom and IT companies at neutral meeting points.

Three Examples

Three examples of these developments are: · Alberta's Supernet Initiative · The Ottawa fiber condominium · Quebec school board initiatives

The Supernet Initiative

Alberta's Supernet initiative is a scheme to unite all of Alberta's 420 communities and government buildings through a provincially-funded network of condominium-owned optical fiber. Private sector businesses will be able to lease capacity and connect to the system. The

system guarantees the cost of bandwidth to all public sector institutions, currently at Cdn\$500/month for 10 Mbps, Cdn\$700/month for 100 Mbps. The network is a mix of fiber builds and existing supplier infrastructure (swap/buy/lease). All participants can buy (or swap) a share of the fiber (during the build or after) or lease bandwidth at competitive rates.

The total cost of this system is \$C 193 million. The Alberta government will hold Indefeasible Rights of Use (IRUs) but will otherwise keep management of the system at arm's length from government operations. Prices charged to users are the costs of the system divided over the number of users.

Alberta:

Current situation Residences 56 Kbps dial Internet (\$85/Month) No high speed Internet Businesses Some T1 Facilities (\$2000/Month average - rates distance sensitive) Some high speed business service on special setup arrangement

Future Situation Residences High speed DSL residential Internet at urban rates (\$40/month) Businesses High speed business services available at competitive urban rates (eg \$820/month - T1) Higher speeds at comparable rates, no distance sensitivity

The Ottawa Condominium

In Ottawa the consortium consists of 16 members from various sectors including businesses, hospitals, schools, universities, research institutes, operating from 26 sites. The network uses a point-to-point topology, joined by 144 fibre pairs. Costs have proven to be from C\$11,000 to - \$50,000 per site, for a total project cost \$CDN 1.25 million. Cost per strand has been less than \$.50 per strand per meter. 80% of the cable is aerial, 20% underground. Due to overwhelming response to the first build, planning for a second build is under way.

The network's costs do not increase much with scale or size. If the condominium fiber contractor were to double capacity of network (i.e.12 strands to each customer), the cost of project would

only increase by 10%. A doubling of the number of participants would increase the cost by only 10% (plus cost of laterals for additional institutions). By doubling the number of participants average cost would be less than \$20,000 per institution. Ultimately fiber costs could get as low as \$1000 per institution if every building in the city was connected with fiber.

Ottawa condominium fiber network

Average total cost has been between C\$7 and C\$15 per meter as follows: Engineering and Design:

- \$1 - \$3 per meter for engineering, design, supervision, splicing Plus Installation: · \$7 to \$10 per meter for install in existing conduit; or · \$3 to \$6 per meter for install on existing poles Plus Premise termination: · Average \$5k each Plus cost of fiber: · 15¢ per strand per meter for 36 strands or less · 12¢ per strand per meter for 96 strands or less · 10¢ per strand per meter 192 strands or less · 5¢ per strand per meter over 192 strands

It has been found that annual maintenance and right of way cost is approximately 5% of the capital cost.

Quebec School Boards and otherLocal Government Initiatives

The government of Quebec has been active in encouraging its school boards and medical institutions to join in condominium fiber projects. Space does not allow for a discussion of the cost figures associated with these builds. However, very significant savings have been achieved, relative to the costs of conventional telephone and other associated services.

Putting together a Fiber Condominium Project

A fiber condominium project at this stage is a matter more of legal, financial and contractual organization than an advanced technical project.

1. A community consortium would put together a plan to fiber up all public sector buildings in their community. A community can be a province, a municipality,

village, etc

2. The plan must make provision for a fiber splice box that terminates the fiber at the street side nearby each public sector building such as a school, hospital, or library. This box is called a "Node".

3. The community must ensure that potential facilities exist nearby for private sector equipment to connect future home owners – a colocation facility. The colocation facility allows private sector interests to extend wireless, VDSL or HFC services to the neighbourhood around the school or public building.

4. Additional fibers are made available from the Supernode to all nodes such that competitive service providers can purchase fiber to the node at some future date.

The Role of Government

Governments can promote the policy of

broadband Internet to the home by · Subsidizing and encouraging early adoption by schools, universities and municipalities;

· Ensuring that the technology is open, cheap, and Internet-only; · Regulating access conditions to ensure free and fair competition; · Insisting that solutions address the "last mile".

In order to convert and build massive infrastructure to new IP-based networks, governments need to:

· Set affordable prices for access to rights of ways, poles and ducts; · Issue carrier licences easily; · Make the legal regime for broadband the same as for narrowband – common carrier, rather than publisher; and · Continuously define the nature of non-discriminatory access to networks, at all layers of the protocol stack, and intervene to promote it; · Identify those areas which will need subsidies to

be reached (do not subsidize carriers, but users)

It is not clear whether political centralization is a good or bad thing in this case. If cities and lower orders of government block these initiatives, uniform national regulation could help. On the other hand, subordinate or smaller units of government might provide many different solutions and avenues to experiment, such as in the fifty states of the United States.

[Editor: Canadian specific text omitted]

As to customer-owned IP networks, the incumbent carriers will do their best to create fear, uncertainty and doubt as to the wisdom of these arrangements. However, like the personal computer was in the 1980's, it is an idea whose time has come.

Spectrum is Not Property by Robert J. Berger

Editor's Note: Posted to "Dewayne-Net Technology List" <dewayne-net@warpspeed.com> on July 4, 2001

"Spectrum could be considered property if it was a fixed limited resource. It may seem like a limited resource because today's technology (actually from the 20's and 30's) required it to be used that way, but it is not an inherent characteristic. Spectrum is really a "commons". It can be polluted by selfish people, but it can also be shared in mutually beneficial ways and it doesn't get "used up". When it is carved up and fenced in by being considered property owned by an individual entity, its value actually decreases (except to that entity). The role of government should be to maximize the mutual benefits and minimize pollution.

There is no real reason why spectrum can't be shared instead of hoarded. Consider true software defined intelligent radios using wideband spread spectrum techniques. These radios could sense the utilization of spectrum in their nearby geographical area and utilize agree-

gate slices of that spectrum that is not in use. The aggregate slices could be gigahertz in size and use time domain or various spread spectrum techniques to support overlapping use. Protocols could be used to optimize the dynamic allocation of chunks of spectrum in real time. Each radio would have dynamic power management and utilize minimal power at any instant. Internet like routing could be used to create huge meshes of such radios, allow each radio to use very low power, but have extremely high bandwidth.

It is even possible to do this "on top of" existing spectrum utilization. By using very low power, wideband techniques, the new signals are in the noise floor of traditional carrier based techniques. Thus we could have a transition period where the unlicensed shared devices overlay the legacy usage until the new techniques completely replace the wasteful legacy uses.

You could have millions of these unlicensed wideband devices all sharing the spectrum and offering much greater services at much lower costs than

today's property style, carrier based devices.

By making spectrum property today, we make it nearly impossible to create such an innovative broadband solution and only allow oligopolies to control our communications systems and thus the ability for individuals to form true peer-to-peer broadband services whose content is not easily controlled by the oligopolies and the government.

Please note that unlicensed does not mean un-regulated. The devices will have to still meet regulations for at least per hertz power levels and so on to guarantee that the spectrum is indeed being shared, not polluted.

One way we could have a peaceful transition would be to create legislation that clarifies that spectrum is not property, auctions and other current allocations are "leases" and that all leasee's must expect to have shared use with future wideband low power, minimally interfering unlicensed users. But this would require a far sighted presidential and/or congressional administration."

ICANN Update: Thanks to Continued Support from Faceless Bureaucrats at Commerce ICANN Expands its Payroll and Continues its Efforts to Police DNS and Extend Governmental and Corporate Intellectual Property Control over the Internet

Editor's Note: ICANN continues to nibble away at all opposition. And with more and more staff extends its tentacles of control into more areas of mischief. Earlier this spring Simon Higgs wrote an Internet draft explaining why there could be more than a single ICANN blessed root.

Defending the "Sacred" Root

On June 24 Steve Coya wrote the RFC Editor Hi Sandy, The IESG requests that both Root Zone Definitions <draft-higgs-root-defs-01.txt> and Alternative Roots and the Virtual Inclusive Root <draft-higgs-virtual-root-00.txt> NOT be published as Informational RFCs.

In the opinion of the IESG, publishing these drafts as RFCs:

- Would be condoning an attempt to subvert the ICANN policy-making process by means of the RFC publication process

- Would make policy statements that are in direct conflict with what the IESG perceives as the IETF community consensus

- Would publish technically unsound set of recommendations.

In more detail:

1) These are informational drafts that attempt to specify policy for the Internet.

2) Portions of them attempt to address technical coordination issues that are under the purview of the DNSOP WG, without having consulted that group.

3) As terminology documents, they define highly loaded terminology.

4) They attempt to mandate ICANN's behavior with regards to new TLDs.

[root-defs, section 8, third paragraph.]

5) "root-defs" is internally inconsistent: it postulates the existence of multiple public root zones, then performs a virtual set union upon all of them, declares that this union is a single globally unique namespace, and states that this virtual namespace should not be fragmented.

6) They claim to agree with RFC 2826 while attempting to completely subvert the point of that document.

7) They suggest that all would be well if all the operators of the multiple putative public root zones would just learn to play nicely together, which has already been proven not to be a viable policy in the real world.

8) They fail to explain what benefit there is to doing all these things in the root zone as opposed to one level down.

Milton Mueller responded on BWG on June 24 So the IETF works top-down, too. I love this business about divining an "Internet community consensus" without having any discussion or exposure. bNow we know why ICANN works the way it does.

By the way, there is no DNSO working group on this topic. As anyone who was at Stockholom knows, the NC and many others don't want one. {editor and on june 24 he added the IESG statement refers to a "DNSOP" working group, which is an IETF WG, not a reference to DNSO.

Root-Dns.org

In the meantime a relatively new website belies the high priests of the IETF: <http://Root-dns.org/> is the Independent Root Operators Network. The home page infoms us:
A number of resources to achieve the

site's stated objectives have been implemented :

GrapeVine - news and issues.

RootExchange - mail list exclusively for root managers.

According to Richrad Sexton. This is the important part. It's a neutral third party run list that is *strictly* technical. No personal or business stuff whatsoever. Given those constraints he's got most of the actors participating. Notable by their absence are: newnet, namespace and icann. This is how we coordinate the root zones. The goal is a unified root.

Only one person per RSC is permitted to join. On the list are

me - orsc
eugene - alternic
jeffsey - cinics
david kam - universal registry
ron kimball narsc
bradley - pacroot
jeff fisher - tinc
robin bandy - opennic

The home page of <http://Root-dns.org/> continues the tool list: Support Matrix - overview of who resolves who.

VueDig real time TLD query tool.

VueScan server monitoring program.

VueScan.TXT latest server scan report.

VueDat.Scan database of server errors.

VueDat.TLD database of all AltZone TLDs.

VueDat.Zone database of root zones.

ZoneExchange root zone file generator.

ZoneFile generic zone file of all TLDs.

Stacking the ICANN Deck

On June 21 the following ICANN announcement was published on BWG.

ICANN Names Counsel for International Legal Affairs Marina del Rey, California, USA (21 June 2001) The Internet Corporation for Assigned Names and Numbers (ICANN) announced today that Theresa Swinehart will join ICANN as its Counsel for International Legal Affairs. Her extensive international background will strengthen ICANN's legal staff during a period when ICANN is focusing on formalizing its legal arrangements with organizations around the world that are involved in Internet coordination.

[Editor: to which one astute observer commented: Isn't she the person who did the most on the NC to hijack and stifle any attempt at reform, and block every progressive move, stack every deck, and bias every report?]

The Fight Over Christmas Island Country Code

<http://www.icannwatch.org/article.php?id=9&mode=thread&order=0> dotcx says 'ICANN Threatens the Stability of the Internet' Posted by michael on Monday, July 02 @ 21:52:58 MDT Contributed by michael

Dot cx Ltd, the de facto Christmas Island registry and registrar, has sent an urgent letter to ICANN Vice-President, Secretary & General Counsel Louis Touton, who appears to be running "IANA", demanding an immediate change to the nameservers and the contact information for the .cx ccTLD. The current nameservers for .cx will become inactive today, July 3, 2001; by persisting in its refusal to change them, says .cx, "ICANN threatens the stability of the Internet". This is only the latest act in year-long drama, memorialized in a series of letters. The current sticking point:

ICANN wants the "local government" (actually, the Australian government) to sign off. And it's imposing conditions on the ccTLD before it will agree.

.cx was originally delegated to a now-defunct company that signed an MOU with Dot cx Ltd. Local bodies in the Christmas Islands approved of the takeover, but "IANA" balked, saying that it would not OK the change until and unless the local government — effectively the distant Australian government — agreed (ICANN also wants the defunct company to give its approval — something which may be difficult since it no longer exists). Meanwhile, however, the Australian government appears to have an agenda of its own: get control over all the ccTLDs it can.

The fate of the Christmas Islands ccTLD is caught up in heady political currents: Christmas Island is a Dependency of Australia, administered from Canberra by the Australian Department of the Environment, Sport and Territories. Much of .cx's difficulty with IANA may be linked to the Australian government's desire to bring the .au ccTLD to heel. But the conditions being imposed by the Australians seem pretty stiff: "we reserve the power to terminate you at any time" is about the size of it. (My favorite, though is this one: "This letter of endorsement cannot be relied upon by Dot CX as an enforceable agreement.") You can read them for yourself in these four large .jpg images of the Australian government's latest letter: Page 1, Page 2, Page 3, Page 4.

Where ICANN (aka IANA) gets the requirement that the local government sign off on an uncontested, friendly, transfer of a ccTLD is an interesting question. The requirement does not appear in RFC 1591. IANA's CCTLD News Memo #1 (23 October 1997) does say,

An additional factor has become very important since RFC 1591 was written: the desires of the government of the country. The IANA takes the desires of the government of the country very seriously, and will take them as a major consideration in any transition discussion.

...but this is not a IETF standards document (neither, technically is RFC 1591, which is labeled "informational"). Further, nothing on the subject of the government's role is mentioned in ICP-1, the document that ICANN issued purporting to describe but not change IANA practices under RFC 1591.

It doesn't seem unreasonable to me for the government to have a say in the re-delegation of a ccTLD when there is some sort of controversy. As an abstract matter, I'm even prepared to accept that a government has full sovereign legislative power to subject a ccTLD registry located in its territory to any rule it can lawfully adopt (recall that ccTLDs must have a local presence). So it seems reasonable to me for ICANN to pay close attention to what local governments say in cases of contested redelegations, if only because they have the ultimate power to force their wishes on a ccTLD anyway. But this is different. It's not a contested case, there are no other claimants, there is no suggestion of mismanaging the domain or unsuitability to task. In the absence of any suggestion of wrongdoing, should ICANN be a party to the imposition of onerous conditions on a ccTLD, or should it leave that job to the domestic authorities who, in this case at least, might have to do it in a more public and democratic manner?

Last but not least is the question of process. This matter has been running for more than a year. Where are the public notices from IANA? What are the relevant procedures? Who is in charge of this issue: the Vice-President, Secretary & General Counsel? The ICANN CEO? Certainly not the Board.

Surely this case argues, yet again, for far more openness and transparency about what "IANA" is doing and how it does it. <http://www.icann.org/announcements/icann-pr21jun01-2.htm>

Whatever Happened to the .eu TLD?

Meanwhile on June 21 Richard Sexton asked: Any servers for [the EU TLD]

yet? Jim Dixon replied: .EU is lost somewhere deep in the bureaucratic processes of the European Union. It's going to happen - sometime in this decade.

Another observer commented: The administrator of the ccTLD of Denmark was concerned that when EU is created the EC will try to impose uniform regulations on all the country codes in the Union based on the rules/standards they adopt for .eu

And yet another attorney responded: It is certain that this will happen. I have spoken to an .eu official who participated in such a discussion.

At which point Jim Dixon commented: There are many people involved. A few cared quite deeply. But the question of setting up a .EU registry is now in the hands of people who don't care at all and to whom the monetary value, if that's what you are talking about, is insignificant. Some time last year ETSI seemed to have the best chances of picking up the registry. However, the ETSI board told the woman championing the idea the registry could not be handled by ETSI itself, that it would have to be spun off as a separate company. They apparently believed that getting involved in the DNS could harm ETSI itself.

As far as I could see, that was the high point of interest in .EU. Discussions on Christopher Wilkinson's email lists gradually tailed off and the lists were shut down around six months ago. It is now official European Union policy that there will be a .EU registry. However, it isn't at all clear who will run a registry if and when it is set up. The only people I know of still actively lobbying for the name to be delegated to them either are, let's say, disreputable or lack any significant backing or both.

The crux of the matter is that no one with the power to push through the registry will gain anything significant from doing so, whereas anyone with any understanding of what's going on can see that the Internet domain name system has enormous destructive potential, politically speaking.

Whoever picks up .EU will face formidable opposition. Lightweight opponents include the ccTLD registries, which see .EU as competition. Among the heavyweights are the trademark and other rights holders, who can field thousands of lobbyists at all levels. The cost of dealing with this opposition will be huge. There are also fundamental issues of international law and sovereignty involved. Weigh all of this against the amount of money involved, and it's easy to understand why people are taking a slow, easy, status quo approach.

On June 27 ICANNWatch had the following comment: EU Ministers Approve .eu Posted by michael on Wednesday, June 27 @ 14:33:01 MDT (read: 84 times)

Reuters reports (via yahoo) that the EU Council of Ministers has approved the Commission's .eu plan. That leaves the EU Parliament to act in July. Reuters quotes an EU minister as predicting that .eu might be active by early next year. Presumably, since it will be a pseudo-ccTLD, it will be spared the additional months or years of negotiation that appear to have stalled the introduction of the majority of gTLDs approved by ICANN.

Meanwhile, Clive Stanbrook Q.C. has posted an explanation to the ec-pop mailing list of the genesis of the CAN-.eu meeting he has called for July 13 in Brussels.

UPDATE: The Ministers adopted a consensus position on the issues, a "Common Orientation for the Dot EU Regulation"; formal action by the Council of Ministers will follow when a final text is drafted to reflect this agreement in principle.

Steps to Unveil .biz and .info

<http://www.theregister.co.uk/content/6/19916.html> . BIZ domain registration a complete shambles, by Kieren McCarthy

The registration process for the new .biz

TLD is so convoluted that even professional registration companies have no idea what is going on. Not only that but it would appear the company behind the domain, NeuLevel, has completely failed to keep up with demand, making the entire process a shambles.

NeuLevel's approach to domain resolution has been described by one industry figure as "decision by committee gone mad". Claiming to make the process fair, NeuLevel has instituted a three-step process, each with its own rules and closing dates. It has no less than four dispute resolution policies

Is VeriSign trying to shaft the .BIZ domain?

by Kieren McCarthy (Register) <http://www.theregister.co.uk/content/6/19917.html>

An email from Network Solutions has been sent to hundreds of professional domain name registrars encouraging them to send as many applications for .biz domains as possible and do it now. It is even offering discounts on bulk orders.

[snip]

VeriSign stands to make enormous gains if the .biz brand is damaged before it even takes off. And there can be no better way of bringing .biz to its knees than by overwhelming it with applications, causing NeuLevel to go into meltdown and ruining its image as a reliable and strong company

(article includes NSI's email solicitation - MLM in find display:

"NeuLevel is treating the random registrant selection process like a lottery the more applications you submit for a domain name the better your chances will likely be of registering that name. To help better your chances, we're providing discounts on application submissions of 10 or more*:"

10-24: \$4.50 per domain name application
25-49: \$4.00 per domain name application
50-99: \$3.50 per domain name application
100+: \$3.00 per domain

name application

So, you pay to submit a .BIZ IPclaim and you pay to defend that claim if others want the same name and you pay to submit a .BIZ application and you pay to register a .BIZ name if you make it through all those hurdles. That's \$95 before you even have a name, and people thought NSI's \$35/year fee was high.

On June 27 Icanwatch had the following comment: The (illegal) .biz Sweepstakes Posted by michael on Wednesday, June 27 @ 21:12:00 MDT (read: 638 times)

LawGeek writes "Somewhere along the line, .biz registry NeuLevel apparently decided it had found the cure to the "gold rush" for hot domains in the new gLTD. Their solution? An old-fashioned raffle! That's right. According to an email Network Solutions Inc. is sending to its customers, you can buy the CHANCE at getting a domain name for nice little "processing fee." As NSI puts it, "NeuLevel is treating the random registrant selection process like a lottery, so the more applications you submit for a domain name the better your chances will likely be..." As many people know, most states require that contests provide an option for participants to enter free of charge, as well as other types of compliance. Should be fun to see where this goes. "

Re: The (illegal) .biz Sweepstakes (Score: 1) by hofjes on Thursday, June 28 @ 10:28:35 MDT (User Info) Every state in the U.S. prohibits lotteries which are not state sponsored (including Nevada, see Nev. Rev. Stat. Section 462.105). Lotteries are comprised of the elements of prize, consideration, and chance (see, for example, National Conference on Legalizing Lotteries, Inc. v. Farley, 96 F. 2d 861, which comes out of NeuLevel's home of D.C.)

The .biz scheme is a no brainer illegal lottery. Prize = domain name registration Consideration = \$5 lottery ticket fee Chance = the chance to win the right to register the domain for an additional \$33

How can NeuLevel argue that its scheme does not violate criminal and consumer protection statutes and regulations in

every jurisdiction of the United States? Should the FTC investigate? Show law enforcement agents prosecute? ICANN approved of this plan. Is it liable too? DOC would not say how .biz and .info would get into the root. But suddenly the deed was done. [end post by "lawgeek".]

Commerce Dept. Wields Domain Name Rubber Stamp in Record Time

Posted by michael on Tuesday, June 26 @ 15:37:42 MDT (read: 276 times)

The ink wasn't even dry on ICANN's formal request for .biz and .info to be added to the root when the Department of Commerce announced (via ICANN) that it would approve the recommendation. Since less than 24 hours elapsed between request and approval, a stunning contrast to the lengthy evaluations used for the VeriSign deal and those planned for the .us ccTLD, the department's unseemly haste strengthens the case for anyone who wished to bring a legal claim that it has unlawfully delegated its decision making functions to ICANN.

As if to underline who is in the driver's seat, at this writing there is an announcement at ICANN, but no announcement appears on the Commerce Department newsroom or on the NTIADomain Name Page.

<http://www.icannwatch.org/article.php?id#0&mode=nested&order=0>

Full Text of HR2417 Contains a Surprise

Posted by michael on Tuesday, July 03 @ 10:04:36 MDT Contributed by michael

A kind person has sent us a .pdf copy of the draft of HR 2417, the "Dot Kids Domain name Act of 2001" (converted to HTML). The bill would require the US Department of Commerce (DoC) to "jointly with ICANN, develop a plan" for creation of .kids. The domain shall use a "green light approach" i.e. "shall be available for voluntary use as a location only of material that is considered suit-

able for minors and shall not be available for use as a location of any material that is harmful to minors". Someone—it's not specified who—will periodically audit .kids to "ensure compliance with requirements". Registrants excluded from the domain will have a right to a due process hearing. The bill also contains a description of the application and selection procedures (written, objective criteria, fees to be limited to actual expenses, excess refunded). Plus it enforces tight deadlines on ICANN.

Turns out, however, there's something else important lurking in the bill: a section prohibiting DoC from ever surrendering the root to ICANN.

Tucked away towards the bottom of the bill is this language, which blocks DoC from surrendering the root to ICANN — ever.

(e) CONTINUATION OF DEPARTMENT OF COMMERCE OVERSIGHT AND APPROVAL AUTHORITY.— During any period that ICANN has any authority for the establishment of top-level generic or county code Internet domains and for selection of registry services for such domains, the Secretary of Commerce— (1) shall carry out oversight and approval of such functions for the Federal Government; (2) shall make every reasonable effort to retain the authority reserved to the Department of Commerce under the Memorandum of Understanding referred to in section 2(a)(1) of this Act and any amendments to such Memorandum; and (3) shall diligently exercise such authority.

Although DoC has recently disclaimed any present intention to turn the root over to ICANN, it previously seemed to suggest that it would be prepared to do so once ICANN finished up the tasks set out in the original MOU. And that has certainly been ICANN's view in its progress reports to the government. Not to mention that many non-US participants in the ICANN process chafe at the US government's role.

Here's how I described the state of play a year ago:

Whether and under what circumstances DoC would turn over the root to ICANN has been the subject of somewhat contradictory pronouncements. In the White Paper, DoC stated, "The U.S. Government would prefer that this transition be complete before the year 2000. To the extent that the new corporation is established and operationally stable, September 30, 2000 is intended to be, and remains, an 'outside' date." White Paper, at 31,744. More recently, DoC assured Congress that it intends to retain its rights over the DNS:

The Department of Commerce has no intention of transferring control over the root system to ICANN at this time [July 8, 1999]. . . . If and when the Department of Commerce transfers operational responsibility for the authoritative root server for the root server system to ICANN, an [sic] separate contract would be required to obligate ICANN to operate the authoritative root under the direction of the United States government.

Letter from Andrew J. Pincus, DoC General Counsel, to Rep. Tom Bliley, Chairman, United States House Committee on Commerce (July 8, 1999), National Telecommunications and Information Administration

Meanwhile, or at best slightly later, DoC apparently assured the European Union that it intends to give ICANN full control over the DNS by October 2000:

[T]he U.S. Department of Commerce has repeatedly reassured the Commission that it is still their intention to withdraw from the control of these Internet infrastructure functions and complete the transfer to ICANN by October 2000. . . . The Commission has confirmed to the US authorities that these remaining powers retained by the United States DoC regarding ICANN should be effectively divested, as foreseen in the US White Paper.

Commission of the European Communities, Communication from the Commission to the Council and the European Parliament: The Organization and Management of the Internet International and

European Policy Issues 1998-2000, at 14 (Apr. 7, 2000), Information Society Promotion Office

Recently, DoC assured the GAO that "it has no current plans to transfer policy authority for the authoritative root server to ICANN, nor has it developed a scenario or set of circumstances under which such control would be transferred." GAO Report, at 30. ICANN meanwhile stated on June 30, 2000, that "[s]ince it appears that all of the continuing tasks under the joint project may not be completed by the current termination date of the MOU, the MOU should be extended until all the conditions required to complete full transition to ICANN are accomplished." Second Status Report Under ICANN/US Government Memorandum of Understanding (30 June 2000), § D.4 (June 30, 2000) Looks as if HR 2417, were it to pass, would sort out that confusion.

Subject: [Ecommerce] FTAA proposals on domain names

Date: Tue, 3 Jul 2001 14:57:26 -0400 (EDT) From: Robert Weissman <rob@essential.org> To: <ecommerce@essential.org>

The intellectual property section of the Free Trade Area of the Americas (FTAA) contains proposals that would obligate countries by law to rely on ICANN for domain name dispute resolution. The just released text of the FTAA is available at:

http://www.ftaa-alca.org/ftaadraft/eng/draft_e.doc

The relevant text follows below, from the trademark section. This is all still subject to negotiation.

Article XX. [Domain names on the Internet

1. Parties shall participate in the Government Advisory Committee (GAC) of the Internet Corporation for Assigned Names and Numbers (ICANN) to promote appropriate country code Top Level Domain (ccTLD) administration and delegation practices and appropriate contrac-

tual relationships for the administration of the ccTLDs in the Hemisphere.

2. Parties shall have their domestic Network Information Centers (NICs) participate in the ICANN Uniform Dispute Resolution Procedure (UDRP) to address the problem of cyber-piracy of trademarks.]

Article XX. [Cancellation and transfer of domain name

In the event that a well known distinctive sign has been inappropriately registered in the country of the Party, as part of a domain name or electronic mail address of an unauthorized third party, on request by the owner or legitimate rightholder of that sign, the competent authority shall consider the matter and, where appropriate, shall order cancellation or amendment of the registration of such domain name or electronic mail address, in accordance with the respective national law, provided that use thereof would be liable to have one of the following effects:

1. Risk confusion or association with the owner or legitimate rightholder of the sign, or with his or her establishments, activities, products or services;
2. Cause unfair economic or commercial injury to the owner or lawful rightholder of the sign, arising from a dilution of its distinctive force or commercial or publicity value;
3. Make unfair use of the prestige of the sign, or of the good name of its owner or lawful rightholder.

The action of cancellation or amendment shall prescribe, for a period of five (5) years from the date on which the disputed domain name or electronic mail address was registered, or from the date on which electronic media, whichever period expires later, except where the registration was made in bad faith, in which case the action shall not be prescribed. This action shall not affect any other action that might be available with respect to injuries and damages under common law.]

As the Hague Conference Diplomatic Conference Ends the Internet and the Public Domain Are at Risk

An essay by James Love

June 20, 2001 [Editor: published to comppriv and elsewhere.]

INTRODUCTION

Today the Hague Conference on Private International Law will end its first diplomatic conference on a new treaty to set the rules for jurisdiction for nearly all commercial and civil litigation. In a world where everyone is struggling to understand how to address jurisdiction issues raised by the Internet, this new proposed treaty imposes a bold set of rules that will profoundly change the Internet, and not only that. As drafted, it will extend the reach of every country's intellectual property laws, including those that have nothing to do with the Internet.

What exactly does this new treaty seek to do? In a nutshell, it will strangle the Internet with a suffocating blanket of overlapping jurisdictional claims, expose every web page publisher to liabilities for libel, defamation and other speech offenses from virtually any country, effectively strip Internet Service Providers of protections from litigation over the content they carry, give business who sell or distribute goods and services the right to dictate via contracts the countries where disputes will be resolved and rights defended, and narrow the grounds under which countries can protect individual consumer rights. It provides a mechanism to greatly undermine national policies on the "first sale" doctrine, potentially ending royalty free video rentals for corporate entities with overseas assets, and it opens the door for cross border enforcement of a wide range of intellectual property claims, including new and novel rights that do not have broad international acceptance. It will lead to a great reduction in freedom, shrink the public domain, and diminish national sovereignty. And practically no one knows anything about the treaty.

This proposed Hague treaty stands the

tradition globalization approach on its head. It does not impose global rules on substantive laws — countries are free to enact very different national laws on commercial matters. The only treaty obligation is that member countries follows rules on jurisdiction and agree to enforce foreign judgments. Rather than a WTO or WIPO type approach of harmonization of substantive policies, every country can march to its own drummer. The treaty is about enforcing everyone's laws, regardless of their content, and enforcing private contracts on which national courts will resolve disputes. It is a treaty framework that made some sense in a world of trade in pre-internet goods and services that lend themselves to easy interpretation of jurisdiction based upon physical activity. It is a treaty that makes little sense when applied to information published on the Internet, and more generally for intellectual property claims, where one should not leap into cross border enforcement without thinking.

THE HAGUE CONFERENCE ON PRIVATE INTERNATIONAL LAW

The Hague Conference on Private International Law is a little known organization that held its first meetings in 1893, but did not have a permanent status until 1951, and since then has adopted 34 international conventions, mostly on very narrow and often obscure topics, such as the taking of evidence abroad, the form of testamentary depositions, wills, traffic accidents, and several dealing with children.

In 1965, the Hague Conference adopted a Convention on the choice of court for civil litigation, but it only was endorsed by one country — Israel. The current effort is a renewed effort to deal with that issue, and also the enforcement of judgments and other items, and the scope is extremely wide — nearly all civil and commercial litigation. It is, without a doubt, the most ambitious project undertaken by Convention, and the Secretariat and the member country delegates are

anxious to establish the Conference as a major league actor in the rapidly changing global political economy. Despite its grand ambition, the Hague Conference secretariat is tiny, about a dozen according to a FAQ on its web page. The small size and low profile of the Hague Conference has allowed this treaty, which has enormous significance, to go virtually undetected, even though it has been in discussions since 1992.

POLITICS OF THE CONVENTION

The official version of this particular convention on jurisdiction and enforcement of foreign judgments is that in 1992 the US began seeking ways to obtain more equitable treatment of the enforcement of judgments from commercial and civil litigation, and was willing to cut back on some aspects of US "long arm" jurisdiction to do so. In the beginning, none of the negotiators were thinking about the Internet, and the treaty seemed to have limited interest to most persons. By 1996 it was obvious to some that the Internet in general and e-commerce in particular would pose special problems for the Convention. By 1999 there was considerable attention given by business interests on how the Convention could be drafted to resolve a number of jurisdiction problems they faced, and in particular, the Hague Secretariat began suggesting the Convention could be used to replace overlapping national laws on consumer protection and privacy with industry lead alternative dispute resolution systems — a top priority for the biggest e-commerce firms.

Meanwhile, Europe was developing its own rules for jurisdiction that made some sense in an environment where you had entities like the European Parliament and the European Commission to force harmonization of substantive law. Europe was also alarmed and jealous of the US leadership in the development of the Internet. European negotiators pushed hard to impose a treaty based upon the EU's Brussels Convention, not only to

preserve the European approach, but to lead, for once, in an important area for the Internet.

The European negotiators were also unhappy with the generally free and unruly nature of the Internet, and saw the convention as a mechanism to reign in hate speech, libel and defamatory speech, "piracy" of intellectual property, the publishing of government secrets and documents on the Internet (the David Shayler case), and other unsettling aspects of the Internet.

The business community, meanwhile, was unhappy with the EU approach to providing consumer protection, including privacy rights, and fearful that the Convention could expose them to lawsuits from several different countries for violating consumer protection and privacy laws.

Meanwhile, Napster had mobilized the music and movie businesses, and they increasingly saw the need for stronger cross border enforcement of copyrights, including the need for injunctive relief aimed at ISPs, and the strong long and order (you can run but you can't hide) nature of the Hague convention was very appealing to an industry afraid of losing control over its own business models.

A few IPS (Verizon and AT&T) and portals (Yahoo, following its education over the French civil suit over Nazi artifacts) saw this as a repeat of the fights over the digital copyright laws, and lobbied to retain some form of common carrier status, which was greatly undermined by the architecture of the Hague Convention, which was to make everyone's judgments enforceable everywhere, even in countries that had no connection to the tort or delict (greatly undermining the usefulness of national "public policy" exceptions).

Within the various member country delegations, you have some that have strong experience in contracts and business to business arbitration, and who see the 1958 New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards as a successful model to emulate. You have other members who

are primarily interested in torts, which come at the issues from a different perspective, and who don't see the convention entirely as strengthening the enforcement of contracts.

In 2000 some elements of civil society became aware of the convention, and in particular, BEUC (the European consumer groups), the Trans Atlantic Consumer Dialogue (TACD), including both US and EU members, the American Library Association, the Free Software movement, and some US free speech groups, such as the ACLU, began to follow the Convention. In 2000 the Consumer Project on Technology made the Hague Convention its top e-commerce priority, and by September 2000 the US government added Manon Röss from Essential Information on the US delegation (which already had several private sector members representing business interests).

For the past two years, in a series of meetings leading up to the June Diplomatic Conference (which ends today), there were efforts to sort of the impact of the convention on e-commerce and on intellectual property. The US in particular was quite open in consulting with civil society and the public in general, and Australia asked for public consultations too, but it would appear that no other countries did. However, while civil society concerns were presented at virtually every negotiating meeting over the past year, this month's diplomatic conference was a powerful illustration of the power of the business lobbies.

The EU seemed to be undertaking a strategy of pushing for a "disconnect" for regional agreements, and in particular, for its own EU directive on Jurisdiction take precedence in EU to EU transactions, leaving intact the stronger EU consumer protection measures for EU to EU transactions, while bowing to US government pressure to gut consumer protection provisions from the 1999 draft of the convention. This was a major victory for the big e-commerce firms.

One element of this was to essentially expand the definition of "business to business" transactions, and to greatly

strengthen the role of contracts in the convention, making for example, choice of court clauses mandatory in almost everything that does not involve personal or household use (and sometimes even then), even when these are "non-negotiated" contracts, such as shrink wrap or click-on contracts. Despite repeated efforts by civil society to fix this, and to limit the enforcement of such clauses where the contracts had been "obtained by an abuse of economic power or other unfair means." — the delegates refused, at least in this draft.

So too there was a complete unwillingness to address the importance of speech related torts, despite the fact that the membership in the Hague Conference now includes China, Egypt and many other countries that engage in harassment of dissent, and which can easily create repressive civil actions to stop dissent. The EU delegates would not even consider adding favorable speech language from the European convention on human rights.

A major objective of CPT, TACD, the Library community and the free software movement was to take intellectual property out of the convention, a move initially supported by the trademark and patent societies, due to the ham-handed way that patents and trademarks had been addressed in the 1999 secretariat draft of the convention, and also the subject of a WIPO sponsored meeting in Geneva in January 2001. In February 2001, in Ottawa, the US government actually circulated a paper to the delegates that said the US would not sign the convention if intellectual property was included. AOL/Time Warner, Disney, the MPAA, RIAA, publisher groups and other content owners went ballistic, and by the June meeting the US position had changed, and yesterday, intellectual property was included in the convention, in a form stronger than ever. Also noteworthy was the new bracketed language:

[In this Article, other registered industrial property rights (but not copyright or neighbouring rights, even when registration or deposit is possible) shall be treated in the same way as patents and marks.]

“Other registered industrial property rights” will cover a lot of ground.

<http://www.cptech.org/ecom/jurisdiction/whatyoushouldknow.html>

<http://lists.essential.org/pipermail/hague-jur-commercial-law/>

There are many more details of the negotiations from the URLs given below. It's time for me to end this for now. For more information, and in particular to understand better how the convention works, see:

<http://lists.essential.org/pipermail/hague-jur-commercial-law/2001-June/000048.html>

To see which countries and agencies are engaged in the HagueNegotiations, see: <http://www.hcch.net/e/members/members.html>

<http://www.gnu.org/philosophy/hague.html>

<http://www.cptech.org/ecom/jurisdiction/hague.html>

<http://www.tacd.org/cgi-bin/db.cgi?page=view&config=admin/docs.cfg&id=94>

Sweden's IT Commission Publishes General Guide to Future Proof IT Infrastructure Booklet Shows How to Plan Physical Fiber Network Architecture

Like Canada Sweden is not leaving its future to the local phone company. They are committed to building a national fiber infrastructure and have just published a "cook book" describing their approach. We recommend that readers be sure to pick up the following document at

<http://www.itkommissionen.se/extra/document/?id=347>

A PDF file of nearly two megabytes in size, it is a 64 page guide to laying fiber infrastructure. The title is "General guide to a future-proof IT infrastructure"

From page 11 we quote:

"2 Purpose, target group and issues considered

This guide is intended to support the process of planning and implementing the development of a future proof IT infrastructure in a municipality and its neighbouring communities (region), as a basis for various applications. The guide is addressed to persons in local government responsible for questions and decisions concerning the implementation of IT infrastructure within a municipality. It is also addressed to those who co-ordinate questions relating to IT infrastructure for neighbouring municipalities. In addition, it is addressed to the constructors of municipal networks. It is at the same time intended as support and input documentation for procurement purposes.

The IT infrastructure which is now being constructed consists of municipal networks, regional networks and national networks between main localities and on the whole is based on the needs of individual actors. In particular, the local development

in progress presents a wide variety of conditions and objectives. Starting with a national vision of a future-proof IT infrastructure for Sweden, the purpose of this guide is to suggest a network structure for fibre optical networks in municipalities and connections to neighbouring municipalities in a region.

This guide deals mainly with passive network components. Using a structural approach it is possible at an early stage to obtain a clear picture of a future network. By creating a target network concerning the appearance of the IT infrastructure in, say, five years' time, the long-term development costs of municipal and regional networks can be substantially reduced. If the physical network structure is not adapted to future needs, communications equipment may prove very expensive or, alternatively, expensive restructurings of the physical network may become necessary. This guide contains general advice and specific recommendations applying to municipalities and regional level. For present purposes, "regional level" refers to the co-ordination of IT infrastructure which should take place between neighbouring municipalities. Adjustments would always have to be made to local needs and conditions. Radio-based and other solutions can also be used in certain connections, e.g. as a stopgap solution for the short-term connection of a point before a fibre optical cable can be laid.

Issues considered This guide deals with the ducting level and with the fibre optical cable level. The guide does not address matters concerning infrastructure and traffic exchange at the IP level between Internet service providers (concerning the IP level, see illustration 3, Section 6.2.3)."

What is the Digital Divide Really About? Marketing IT Hardware, Software & Services or Helping Communities Sustain their Economies & Independence? Larry Irving Lashes Out at Dave Hughes over the Digital Divide

On Mon, 2 Jul 2001, on the Cyberteletelecom mail list **Tony Rutkowski** [referring to a url in Robert Cannon's Cyberteletelecom news] Michael Powell's Mercedes Divide by Larry Irving, Wash Post 7/2/01 <http://www.washingtonpost.com/wp-dyn/articles/A1930-2001Jun29.html> wrote: Larry here is playing Washington low-blow politics.

A link to the original *Washington Post* article should have been provided, where Michael amply explains the context in which he was using the Mercedes Divide analogy. It has to do with the fundamental question of how much to you reallocate out of other people's pockets to provide how much bandwidth and computing capacity for others, elsewhere.

Considering how badly misused the Digital Divide term has become internationally - justifying such notions as charging and accounting principles for IP traffic - the term has clearly outlived any utility it may have enjoyed.

On July 2, **Dave Hughes** added: Irving also says: "While more than 150 million Americans are connected to the Internet today, almost as many Americans are not. Those unconnected Americans disproportionately are poor, residents of our rural communities or urban centers, disabled, black, Hispanic, Native American or senior citizens. By belittling the concept of the divide, the chairman detracts from the need for action to assist these Americans."

And Larry Irving, when he headed up the National Telecommunications and Information Administration - NTIA - didn't do a damn thing when I handed him SEVERAL TIMES, on a silver platter, a major solution to cost-effective connectivity in rural areas - no-licence wireless. Which NTIA could have, and should have, pursued. But utterly ignored - yeah,

I mean Larry personally. And now still bleats about the 'digital divide.'

On Tue, 3 Jul 2001, **Adam Peake** wrote: Relevant portion of Ahrens' article follows. And I'm with Larry. Powells' remarks is indeed specious, as his his remark "I had a professor once say to me, 'Name a technology that has bypassed poor people.'" "

Dave Hughes replied: The reason I am NOT with Larry, is that he did so little to actually 'solve' the problem, rather than just talk about it.

There is a deeper subtlety in Powell's remark, bad choice-of-images as it was. And that it "There is - or should be - no free lunch with the Internet. Everybody has got to pay, and its up to them to decide whether they can afford it." What is Irving saying? The poor should be just 'given' the Internet? Free lunches for 'the other half' who are not connected?

But my case against BOTH of them, is that neither paid any attention as to how to lower the real cost to the end consumer. Powell believes in just the same old telco 'trickle down' to rural areas - like the diffusion of cell phones. Irving believes in government subsidies. I believe in better technology - no licence wireless.

So is it any wonder I got a call from the director of a multi-million project which already has brought satellite internet to single buildings in 115 Navajo Nation villages, on how my no-recurring cost wireless might extend it *across* the towns to end users, without expecting someone to come in and install recurring-cost DSL or Cable, where there is virtually no market? (too 'Mercedes') My buddy Red Boucher, ex Lt Gov of Alaska, did just that (extended wireless across the village from the satellite terminus) in

the Eskimo village of Toksook Bay, AK, and now the villagers are *earning* money selling their products via the net. Where was Irving when that story made the Washington Post, while he was still in office?

But there are none so blind as those who will not see - in Washington. The only town I know where EVERYONE has blinders on.

Tony Rutkowski: Count me in with Powell then. Communications Week International Bottom Line - It is time to get over the digital divide By Tony Rutkowski <http://www.totaltele.com/view.asp?articleID3744&Pub=CWI&categoryidp5&kw=rutkowski>

One **Dave Hughes** (or Steve Goldstein for that matter) is worth a thousand bureaucrats and international conferences repeating the Digital Divide mantra. The economics will always be there. What we need is actions and solutions that make a difference.

As an example, the OECD a couple of weeks ago held a conference on Internet access at the German Federal Ministry of Economics and Technology in Berlin. Along the Invalidenstrasse outside the office building, there were fibre optic cable pull boxes for no less than six different major carriers. The aggregate capacity lying along the street was probably measured in the yottabit/sec range.

Inside, there was a session on....you guessed it, bridging the Digital Divide. Inside, I also walked up and down the meeting hallways with my laptop - holding up my modem card, my 10/100 baseT network card, and my 802.11b wireless card, asking "where can I get Internet connectivity." There was none to be had. The irony was sublime.

Of course, in picking up one of the Ministry's pamphlets, it was apparent there were bigger problems. In a recent poll, 55% of the German population said they didn't like information technology - which raises an interesting question. If you have the money and the technology and don't want to use it - is that within the ambit of the Digital Divide. :-)

Then Iving himself joined the argument:
Date: 3 Jul 2001 07:58:26 -0700 From: **larry irving** <lirving@irvinfo.com> To: amr@ngi.org, Dave@oldcolo.com Subject: Fwd: Re: Cyberte telecom News 7/2

Gentlemen. I unsuccessfully attempted to post this reply to your comments about my letter to the editor. I did want to ensure that you received it. Feel free to post. Larry

Start of forwarded message ———

Subject: Re: Cyberte telecom News 7/2 To: CYBERTELECOM
-L@LISTSERV.AOL.COM From: larry irving <lirving@irvinfo.com> Date: 03 Jul 2001 07:36:01 PDT

To David and Tony,

I did not and do not engage in "low ball Washington politics". First, I do not control how and whether the Post links Letters to the Editor. Further, the Post did explain Michael's full position in context. The June 12th article extensively covered the Chairman's views. It was, in fact, that full discussion that caused me, six months after Michael's original comment to respond in the press.

I long have felt that the Mercedes Divide comment trivialized what most Americans, and an even larger percentage of global policymakers, believe is a pressing social, political and economic issue. I kept my concerns to myself. I was particularly aggrieved, however, with Chairman Powell's comment in the June 12th Post article that efforts to bridge the digital divide were analogous to "socialization" of our nation's telecomm infrastructure. No one ever has suggested such a thing. There are no efforts to socialize telecommunications in this coun-

try and I thought it important that the record be clarified. That's why I wrote the letter to the editor. It was not, in my opinion a cheap shot. Spirited debate about public policy issues is part of the foundation of this democracy. I like and respect Mike Powell. I firmly disagree with his comments (and the Bush Administration's silence) about the Digital Divide.

There will always be debates about the role of society and government in assisting people who don't have access to technology. This nation has a long proud history through universal service programs, lifeline programs, the REA, RUS and other initiatives of assisting people get connected to our telecommunications grid. The e-rate, community technology centers, and similar initiatives are merely new efforts to solve old problems. Let's talk fairly and openly about how best to address these problems. Let's not dismiss or deride efforts to assist the least fortunate in our society.

Now with regard to Dave and his continued rants about "his solution" to increased connectivity. I am sure that he believes that he has found the silver bullet for rural connectivity in the low cost wireless technology he opines about so often. Unfortunately, his view is a minority opinion. Yes, I spoke to him several times (in fact, innumerable times) about his views on how to bridge the divide. I passed on his views to my colleagues and to others outside of government. Most of us agree that Dave has an approach that may assist with the issue of affordable connectivity. There is by no means unanimity as to the merits of his suggestion. I am not a technologist or engineer. I am a lawyer and policy advocate. Like most people, however, I tune out when I hear the same song over and over, whether it is a classic like "Respect" or piffle such as "Sugar, Sugar".

I have no idea whether Dave is an Aretha or the latest incarnation of the Archies. I am, however, tired of his song and his insistence that he and he alone has the right answer. Now that I am out of government, I feel no obligation to listen to Dave's tune over and over again. So, I

can and will just tune out his particular station.

Dave, the administration has nominated a new assistant secretary. I hope she provides you as many opportunities to express your point of view as I did. One suggestion. People are more likely to listen if you avoid the self righteous, condescending ad hominem attacks. Lets make that two: Hyperbole and bluster do not go over well at a first meeting either.

I do, however, want to thank you for reintroducing me to Hedy Lamarr. Because of you I now know that she was a very successful technologist and not just a 40's actress and one of the best tag lines in "Blazing Saddles..." Larry

Dave Hughes replied: Well, Larry can say he 'tunes out' my repeated assertions that no-licence wireless can go a LONG way to bridging the rural 'digital divide' - but then having never tried it - even funding with the NTIA funds a serious field test of the proposition - he hardly can say it won't work. As he admits he only sought the 'opinions' of others. The difference being, I go do it, try it, and see how well, or not, it works. And I have always aimed PRIMARILY at, and reported on, the very disadvantaged communities Larry says he champions. What I have championed, works. Period.

The National Science Foundation thought enough of my efforts, to have now shoved over \$2 million at me (unsolicited, I might add) in 5 separate grants, over the past 6 years through my very small company (not a big university or government agency) to try it some more - for Education, especially rural, for the 3d World (Mongolia), for Science. You can find the real-world findings on these at <http://wireless.oldcolo.com>

As for the 'first time' I got the message to Larry, his then, quite technical, assistant, Laura Breeden spent two hours with me putting me through a rigorous 3d degree about no-licence wireless. She got it. But nothing came of it from the upper reaches of NTIA. Why? The 'opinion' of other lawyers? My stridency on this issue has gone up in proportion to the increasing

deafness of those in Washington. Or unwillingness even to see if it works, and commission studies on it based on FIELD TRIALS, not just corporate technological (i.e. telephone wires) precedences.

Incidentally, since I first championed wireless, back in 1994, it now delivers 100 megabits per second 20 miles for the cost of the pair of radios in rural San Diego County, over 100 small ISPs are delivering 10mbps wireless Internet services, mainly in rural areas - in spite of all its government imposed limitations, Starbucks and Microsoft are going into business offering wireless connectivity everywhere they have shops, 90,000 square miles in rural, badly telcos served, south eastern Iowa are being served wirelessly (Keokuk) by a small company, Interlink. L.C. who got OUT of the wireline business, and 93 companies are now making 802.11b (standard) radio products which can interconnect to each other, as well as the net. This 'minority view' Larry talks about sure seems to have legs - no thanks to his lawyer friends in DC, and in the FCC in particular.

But the main point I want to make is - where are the OTHER solutions for bridging the 'digital divide,' if wireless is so bad? I'll continue my rants - and deployments of wireless as a solution, not a problem.

Rutkowski: It's not only Washington! It's almost every bureaucratic capital - and especially Geneva. Try going to the ITU website and doing a search on "unlicensed wireless" and recall that the organization is the global controller of spectrum.

Next year the spectrum mafia can celebrate the 100th anniversary of the basis for the "allocate it, allot it, license it" regime. It's origins derive from an irate German prince who arrived in New York harbor in 1902 who could not communicate his arrival to shore via the then totally unlicensed wireless spectrum. He assembled the next year in Berlin, the first international radio regulatory conference to write a treaty to put an end to

unlicensed wireless spectrum.

One hundred years later, we still have a regime crafted for 1903 technology...and an irate German prince.

Irving: Let's talk fairly and openly about how best to address these problems. Let's not dismiss or deride efforts to assist the least fortunate in our society.

Rutkowski: Plainly Powell was doing the former and not the latter. It's appreciated that the slogan was your baby, but considering it has been co-opted internationally to advance directions harmful to the Internet's development, the administration is well advised to distance itself. Simple generic slogans for dealing with complex problems have a significant risk.

Irving: Now with regard to Dave and his continued rants about "his solution" to increased connectivity. I am sure that he believes that he has found the silver bullet for rural connectivity in the low cost wireless technology he opines about so often. Unfortunately, his view is a minority opinion.

Rutkowski: Fortunately Susan Ness did listen; and responded at this matter *very* differently. This subject, incidentally, goes back to the late 70s and involves considerable contention played out in IRAC where NTIA typically retarded the growth of these technologies while the Commission sought to foster them. Perhaps it should be noted that NTIA's principal role is to protect and advance Federal agency spectrum interests and activities, not the public's. Your depreciation of Dave and these technologies is most unfortunate, but part of the problem.

Some Remarks by your Editor

I have known Dave Hughes well for more than twenty years. His life as I have watched it unfold over that time has been a source of continued inspiration. He sees this technology serving as a foundation that could enable individuals to be-

come entrepreneurs and work for themselves instead of as employees of huge corporations. Dave Hughes still lives in the same house in the working class part of Colorado Springs that he did when I met him on EIES in 1980. He carries a vision of this technology as an enabler of the same American values that sustained this country long before the urbanization brought on by the industrial revolution. He has a record of more than 30 years of building up his own local neighborhood in Old Colorado City and using digital technology to enable the revitalization of that neighborhood by almost single handedly leading it in the creation of new small proprietor-owned businesses. Before that he, a West Point Grad, was a Korean war hero, advisor to Defense Secretary McNamara, Vietnam Veteran and third in command at Colorado's Fort Carson. Asked by General Bernie Rodgers to accompany him to NATO in 1974, where an affirmative choice would have met a life time army career and rise himself to General, Dave instead retired from the US Army determined to make a difference in his own back yard. Using the earliest micro-computer technologies he did exactly this.

I have seen Dave Hughes do many things since 1980. I have never seen him motivated in any way do anything that would have any result except bringing the lowest cost technologies into use by the largest possible numbers of people. Dave Hughes has consistently pursued issues and goals because doing so was RIGHT. Because doing so was a lesson in what we were taught in grade school about what America stood for and what we now know in our mature cynicism to be true all too seldom the truth. And this brings us to the NUB of the problem. While the spread spectrum technologies that he advocates will help ordinary folk, they will likely bring only losses to the incumbent local telco's. I submit that the answer to the digital divide issue by those pursuing it is far more marketing and money than any shred of doing what is RIGHT for anyone.

Why I wondered did Larry Irving lash out with such disdain? A look in Google under Larry Irving's new consulting

company (the Irving Information Group) was instructive. It seems to me that digital divide is about **MARKETING** and sales of IT hardware and software. It is about getting all American to use **PAID** services. It is **NOT** about no cost telecommunications services promoted by Dave Hughes. Consider the following excerpts from *Business Week*.

News: Analysis & Commentary Business Week, December, 20 1999 By Roger O. Crockett
<http://www.dmeinteractive.com/about/bizweek.html>

"Commentary HIGH TECH'S BIG MARKET? TRY THE INNER CITY"

"For years, policymakers and concerned members of the high-tech community have spoken of a digital divide-between technology haves and have-nots. But despite their concerns, the niggling disparity persists. If that doesn't change, the cyber ride that is propelling the U.S. economy into the next millennium could sputter. Indeed, if the technology revolution leaves low-income Americans behind, all of America will suffer. [Snip]

But more discussion of the problem isn't going to help. Nor are the welcome and generous gifts of computers and other gear that tech companies routinely make to inner city schools, libraries, and other institutions. What's missing is a committed effort to sell computers to these forgotten folks. Nothing fancy. Just a nicely targeted marketing campaign, and maybe a few inner-city stores, to demonstrate the benefits of the Internet. Simply put, companies ought to make the same investment in inner cities that they do elsewhere in the U.S. and overseas.

There's more money in these "blighted" areas than many businesses realize. Inner-city consumers there spend \$85 billion annually, 7% of U.S. retail sales, according to a study by Pricewaterhouse Coopers and urban-advocacy nonprofit [Snip]

After all, the number of African Ameri-

cans going online will soar from 23% this year to 40% in 2000, according to Forrester Research. Hispanic users will jump from 36% this year to 43%, while whites' usage will only climb from 34% to 44%. Every white geek with an income of \$100,000 is online," notes Larry Irving, president of Irving Information Group, a Washington technology consultant. "The low-hanging fruit had been gathered." Now, it's time to do some reaching."

Editor: End of Newsweek excerpts.. From http://www.truste.org/about/truste/about_irving.html we learn that "Larry Irving is the President of the Irving Information Group, a consulting firm providing strategic planning and market development services to international telecommunications and information technology companies." [snip]

"Mr. Irving is widely credited with coining the term "the digital divide" and informing the American public about the growing problem it represents. He initiated and was the principal author of the landmark Federal survey, *Falling Through the Net*, which tracks access to telecommunications and information technologies, including telephones, computers and the Internet, across racial, economic, and geographic lines. Mr. Irving also was a key proponent in the Clinton-Gore Administration of policies to protect the diversity of voices in the commercial broadcast arena and to promote increased opportunities for minorities, women and rural Americans in the emerging digital economy. [Snip] In recognition of his work to promote policies and develop programs to ensure equitable access to advanced telecommunication and information technologies, Mr. Irving was named one of the fifty most influential persons in the "Year of the Internet" by Newsweek Magazine, which described him as the "Conscience of the Internet". [Editor: If anyone is the Conscience of the Internet it is Dave Hughes, not Mr. Irving whose conscience speaks beautifully for itself in his rant above.]

He also was recognized for his efforts to bridge the digital divide by, among oth-

ers, the Alliance for Public Technology, [Editor: largely funded by the ILECS] the National Association of Telecommunications Professionals and the Indigenous Broadcast Center of Anchorage, Alaska."

Irving's above bio excerpts appear on the Truste web site where he is a Board member. What was TRUSTE all about we wondered?

According to its website: "Truste's Board Members bring valuable experience, diverse backgrounds and important insight to the privacy issue. As technology experts and business leaders, the board provides visionary guidance in TRUSTE's mission to build consumer trust and confidence in the Internet."

Hmmm. Who were the corporate sponsors we wondered? The web site lists: AOL, Excite@Home, Intel, Intuit, Japan Engineers Federation, Microsoft, Concentric Network, Engage Technologies, Novell, Pricewaterhouse Coopers LLP Symantec, Verizon Communications

Among the Board members according to the site are Roger Cochetti Chief Policy Officer VeriSign; David Hoffman General Counsel Intel Corporation; Larry Irving President Irving Information Group; Jill Lesser Senior Vice President Domestic Public Policy AOL Time Warner, Inc.; Richard Purcell Chief Privacy Officer Microsoft. Hardly your grass roots community.

Bridging the Divide though Meging the Internet with Cable TV

"Trevose, PA - June 22, 2000 - WorldGate Communications, Inc. (Nasdaq: WGAT) today announced the appointment of Larry Irving to the company's Board of Directors."

<http://www.wgate.com/news/2000/0622.html> "We believe the cable industry can provide market based solutions that will help close the existing Digital Divide," commented Hal Krisbergh, CEO of WorldGate. "We share a common desire with Larry to create solutions that result

in everyone having full access to the Internet and all the opportunities it can bring. We are very happy to have Larry join our board.” Headquartered near Philadelphia, WorldGate, a leader in the development of interactive television, was the first commercially deployed service that enabled cable subscribers to access a full array of high-performance, low-cost Internet services and e-mail on their cable television sets and the cable television infrastructure rather than a personal computer and telephone line. WorldGate is currently deployed domestically in cable systems owned by Buckeye CableSystems, Charter Communications, Click! Network, Comcast Cable Communications, Massillon Cable and Prestige Cable. WorldGate and Charter Communications in partnership with the city of LaGrange, Georgia are participating in a one year program that provides free WorldGate Internet access to all cable subscribers in an effort aimed at closing the “digital divide.” WorldGate has international deployment and trial agreements with 21 multiple system operators in 13 countries worldwide.

Meanwhile at the Western Cable show in November 2000: Bridging The Great (Digital) Divide Room 404 As policy makers focus on the need to ensure equal access and opportunity to the digital world, what is the cable industry doing to help close the gap between the haves

and have-nots? How are operators in smaller, rural markets gearing up to deliver advanced services? Beyond technical access, how are operators in urban markets ensuring that equal access is available? Panelists discuss the implementation of various initiatives, and assess their effectiveness Moderator : Peggy K. Binzel, Executive Vice President, National Cable Television Association Speakers: Larry Irving Former Assistant Secretary of Commerce for Communications & Information Director, National Telecommunications & Information Agency Irving Information Group, Hal Krisbergh, Chairman & CEO WorldGateSM Curtis Symonds Executive Vice President, Affiliate Marketing & Sales, BET; Rocco Comission, Chairman & CEO, Mediacom Communications Corporation.

And on the American Library Association website: Larry Irving, former assistant secretary of the U.S. Department of Commerce, received the ALA’s James Madison Award for his work to identify and overcome the “digital divide” between computer haves and have-nots. The award, which recognizes government efforts to promote openness, was presented on March 16, 2000, by then President-elect Nancy C. Kranich as part of Freedom of Information Day activities. Irving is now president of a new company, Irving Information Group.”

What Interests Benefit?

Let's be perfectly clear about the meaning of the so called digital divide. Given the above evidence, we conclude that, for Mr. Irving, likely views it as a marketing opportunity to sell hardware and software and the Internet in the form of recurring monthly service fees. It looks to me like a marketing opportunity for corporate America on whose behalf he advocates the use of public money to prime the pump for the extension of computer use and ownership. I dislike the approach because it seldom, if ever goes beyond the superficial attitude of "close the sale and move on." Dave Hughes vision on the other hand emphasizes understanding the needs of each community into which the technology will be brought. With such understanding comes a focus on training so that the infrastructure is used in ways that go beyond on line purchases. Most significantly Hughes seeks to give each community through spread spectrum wireless a way of owning as much of infrastructure as possible and obtaining connectivity to the net at the lowest possible monthly cost. When he asked Irving while he was running NTIA to back measures that would help local communities but not the local phone companies, Dave Hughes misunderstood the real purpose of NTIA's focus on the digital divide . Given the vehemence of his personal attack on Dave, I believe Irving decided that he could not afford to explain they way the system really works.

Executive Summary:

Internet Dilemma, pp. 1 -7

We take a detailed look at how most all of telecom except for the ILECs fell off the precipice. We conclude that without intelligent public policy designed to act as a counterweight to the ongoing consolidation of the "free-market" the AOL/Time Warner "Walled Garden" business model of the Internet may well become dominant. We need to make understanding and emulating the Canadian approach to enabling the building of community owned fiber networks a high priority. We find and conclude that:

1. Classic industrial age business cycle has overtaken information age infrastructure build and brought with it oversupply and slump.
2. Matched against big business practice and philosophy, edge control is no control. Edge control has no defensive capability and thus is ripe for takeover and top down control.
3. Vertical top down control, ownership and integration of networks squeezes liquidity up and out of the entire system.
4. We need to understand fully the implications different economic models for the Internet. Is the Internet to be un-

derstood as composed of thousands and hundreds of thousands of local private enterprises and municipalities at every layer of the global network who operate under local democratic regulation, or is it to be seen as a cartel of 12 or so intertwined global media and distribution corporations who control and staff their own nominal regulators at ICANN and WTO.

5. While in an abstract sense the distinction is still quite clear, the failure of 96 Telecom Reform Act blurred the Net-head vs. Bellhead split. It can be said that we now have mainly companies with varied degrees of bell headedness.

6. The technologies which once defined the ideologies are themselves converg-

ing both in applicability and in price. This convergence is another driver of the above "blurring". Everyone is using a varied mix of technologies that were formally understood as particularly Net-headed or Bellheaded.

7. The Nethead ideologues were like settlers of the early American frontier west. And when the railroads pushed through and established towns and sufficient presence and support infrastructure and enforcement personnel, the frontier was brought to heel.

8. The regulatory playing field of ILEC versus CLEC that was created by the 1996 telecom act was in fact tilted on behalf of the ILECs and the inability of the FCC to enforce opening of local markets to competition.

9. Netheaded, green field, would be first movers borrowed vast sums for their fiber build outs driven by flawed estimates of bandwidth growth which, if accurate, would have given a successful first mover great payoffs. The result looks like a glut and the inability of the would be first mover to get enough cash flow to pay their debts.

10. The ILECs out lobbied, outspent and outsmarted the builders of the Greenfield fiber plays and the Internet

11. There will be a fiber fire sale. The questions are who will be allowed to buy? Will there be *any* public interest test, any monopoly or anti-trust test or regulation, any access or control or preference given to the localities in whose earth the fiber runs, and whose residents and business and institutions are the logical first choice to benefit from this fire sale?

12. The traditional American model has been that of local and individual ownership and local and individual responsibility for the physical necessities of life. Our telecommunication policy has abandoned these ideals.

13. Yet we define telecommunication as a necessity and then through the Schools and Libraries corporation part or the uni-

versal service fund extract money from the community for use by distant corporations

14. We need a national debate on problems of media concentration and distribution channel monopoly versus the feasibility of community owned and operated alternative infrastructure.

15. The struggle is aimed at control a technology that is most fertile if uncontrolled. The way things are headed the struggle for control may kill the "golden goose."

16. Are we to have networks with end to end connectivity that we can use in ways that we see fit rather than have our usage subject to the rules of a central authority? Can a "private vehicle/highway" model survive alongside the "railroad model?"

How to Build non Discriminatory Broadband, pp. 8-12

We publish an essay by Francois Menard. What Menard convincingly shows is that, given intelligent use of regulatory power, discriminatory interconnections and unfairly priced rights of way do not have to remain undue barriers to broadband. Menard demonstrates how communities could force the aggregation of demand onto the same infrastructure. He illustrates why doing so will be a necessary precondition for any sound business case for fiber to the business or fiber to the home. While local loop monopoly regulations have forced aggregation of demand in a way that sustains the PSTN. He shows how demand aggregation can be achieved on a fiber optic infrastructure without requiring that a utility be given a monopoly on services.

He argues that the necessary preconditions for broadband can only be truly realized when end-users can directly influence what equipment is attached to the infrastructure, which requires that dedicated infrastructure, such as customers owning rights to specific fiber optic strands within the same cable. He doesn't discount the use of wave division mul-

tiplexing, frequency division multiplexing, time or code division multiple access or even optical packet switching equipment, but warns that any use of such technology constitutes what he calls "service-defining bottleneck facilities". He argues that owners of networks must mandate that physical open access be provided at the location of every such service-defining bottleneck facility. This is necessary, he suggests so as to enable other carriers to bypass such bottleneck facility, in order not to have imposed on them a certain type of service or business model. Regulators of the facilities based competition model are missing this point and are relying on what in fact constitutes discriminatory interconnections.

Just as it is seen as a proper and accepted role of government at local, regional and national level to set the rules for building and use of physical highways and the clover leaves by which they interconnect, so should government, from the community upward, determine the rules for building and interconnection of fiber based packet data networks. While the current system protects the interests of ILEC stockholders, it may only bring broadband "walled gardens" to most customers several decades from now. Menard contends that regulators are too busy with working the bugs out of regulations that are supposed to enable local competition in telephony. Consequently, they are unaware that they have the ability to ensure that we do not miss out on the opportunity, feasible today, of bringing broadband to everyone. What Menard describes is the technology and regulatory approach that will enable communities to extend fiber to government, schools and business, and then to homes immediately.

The architecture that Menard advocates would bring the fiber strand from the individual business or residence to the nearest carrier neutral co-location site where the owner of the strand could choose what services he or she wished to be connected to. The use of new technology such as high density ribbon cables and patch panels, micro-tubing and the ability to blow fiber through conduits would enable cost effective build outs.

Investigation is underway to determine what the exact costs and best architectures are likely to be. The point is that in Canada there is now a regulatory impasse where CLECs have been given mandated access to unbundled network elements at discounted prices while they build out their networks. The discounts were to end within five years. However seeing that the objectives are not being achieved, the regulators have extended the discounts indefinitely - an act that deprives the CLECs of the very incentive necessary to build competitive infrastructure. In this essay Menard argues that it is time to throw out the current approach, adopt well defined standards of interconnection and encourage communities to act as referees of equal access to their rights of way. [Note: The preceding text also appears as part of this article's introduction.]

Two quotes from the essay: "What now appears to be needed from telecommunications policy are regulations which will favor the aggregation of end user demand onto a single fibre optic community network. But regulations must also explicitly mandate the disaggregation of services by enabling customer-owned physical-layer equal access onto carrier-neutral facilities. In other words every carrier can offer its own set of services while being unable to prevent a competitor from offering a completely different set.

Furthermore, this regulation should call for municipalities to provide for the support structures necessary for customer-owned fibre optic strands under cost recovery principles similar to those of other municipal infrastructures. It is to be expected that some municipal administrations will be less interested than others in venturing into providing telecommunications support structures. Therefore it will be necessary for regulators to get an explicit mandate from the government to be able to regulate how cities are to be compensated when carriers are required to acquire rights of ways and build their networks should the municipality not be willing to do it."

Finally, we have written a more generalized set of findings based on his essay.

1. Broadband is an essential public utility. Access is only half the broadband issue. The other half is end user (consumer choice) of service model at the point of access.

2. The regulatory model for existing cable and copper last mile loops was conceptually flawed and has failed enable any over build of new technologies.

3. While regulated carrier competition has failed, however, private local networks are being built by municipalities and local schools. These local public infrastructure networks could become well placed to provide service as a competitive market alternative to the current monopoly telco and monopoly cable incumbents, particularly in areas that the monopoly incumbents refuse to serve with high speed access, or with choice.

4. When the broadband market fails because of monopoly, the local communities have a duty to provide market alternatives to their residents and businesses.

5. Canadian regulators are grappling with deployment and development issues at least two generations ahead of the current American telecommunications landscape.

6. To date Canadian school districts and municipalities have been building their own fiber networks. To make the economic case for fiber to the home Canadian municipalities will have to take adopt a new model where the municipality no longer operates the network but instead uses its ownership of rights of way to become an impartial referee on behalf of equal access.

7. The ideal business, technical, and regulatory model places the municipality in charge only of guaranteeing what it has always guaranteed--public rights of way access and non-interference, and regulating which services shall have access to the public Rights of Way and under what terms, conditions and fees for use, including how they must mutually assist and coordinate with each other. The technology enables the city's responsibility for maintaining physical equipment to

be extremely limited, as would their billing for service model.

8. As in all natural monopoly/limited distributor situations, the end user cannot freely choose nor freely change distributor because the distribution channels are either prohibitively capital intensive or prohibitively spacially intensive. Therefore, the physical interface to the consumer for these natural monopolies are best regulated and coordinated by the local municipalities, as several hundred years of time and experience in thousands of essential public utility contexts have shown.

9. The ancient public-private contract of monopoly and public grant of special easements and tax relief and tax funded public investment given to private telco corporations for 100 year old technology does not imply an eternal commitment by the public to support these same corporations as exclusive beneficiaries of public tax funded relief and assistance, when new technologies and new businesses develop which can serve the public in better ways and at lower cost.

10. The 1996 regulatory model for encouraging market opening and active infrastructure competition has failed. In Canada it has done better, but not a lot better. And in hindsight we see that there is no business case to be made for any permissive regulatory framework that will effectively draw the ILECs into investing in full scale residential broadband, much less broadband choice. It is too much in the financial interest of the telcos and the cables to drag their feet forever.

11. In Canada careful review of rights of way agreements will uncover impacts on school and municipal networks that may be undesirable, as well as finding that current RoW agreements favor incumbent telcos and cables. RoW reviews should be comprehensively undertaken to favor broadband competition, consumer access, and consumer choice and municipal alternatives.

Level 3's Vision, pp. 13 - 29

We offer two interviews. The first is with Ron Vidal, Group Vice President for New Ventures and Investor Relations. The second is with Robert Hagens Sr. Vice President, Global Architecture.

The interviews have shown us that Level 3 Communications Inc. is a very impressive company that may have made just one major mistake. It's raison d'être was to leverage the new fiber and packet network technologies by building a global infrastructure and becoming a global sales engine of highly cost effective transport to carriers and enterprises. Level 3 is finishing its very impressive global build out. Only Global Crossing can boast infrastructure in any way comparable. The mistake that Level 3 made was to build an infrastructure predicated on bandwidth growth assumptions that have proven to be without foundation. Consequently it has huge amounts of fiber and the ability to lay far more additional fiber than anyone else. It has also burned its way through billions of dollars. But without the explosive bandwidth growth it finds itself competing with all the other new fiber players to find enough customers to light its fiber and give it enough income to pay its expense and the interest on 7.9 billion dollars of debt.

Level 3 will likely do what ever it takes to survive including selling its European operations if necessary. While it has announced a large layoff it has major lines of business.

Almost three years ago we reported on its development of IPDC and an early Softswitch product. Softswitch is now a managed modem or modem wholesaling service used in huge quantity by Earthlink and AOL. Softswitch is reported by a source outside of Level 3, to have driven down the monthly dial up port cost from 15 dollars to three dollars in just the past year. According to Hagens Softswitch is also used for some voice-over-IP services. Level 3 has SONET throughout its network which also. This permits it to do a large amount of VPN

business for large corporations. Level 3 sells both VPN and IP services to large corporations. It also has positioned itself as a carrier's carrier. Someone that a network like MCI could go to for lambdas more cheaply than it could add them to its own fiber. It brags persuasively that its network is put together with enough flexibility to enable it to choose from the most cost effective technology in adding bandwidth when it needs to.

Should Verizon, or SBC or any of the ILECs get permission to sell long distance one of the things that Level 3 would love to do is sell it bandwidth to the rest of the world. here is how Vidal presented the philosophy.

"As a carrier's carrier we are a company without a sales organization competing heavily for retail customers with those of our customers. We do sell to enterprises occasionally, especially those that operate their own networks, but our focus is very much on the top 300 bandwidth customers around the world. And we think we're unique in this position. For example Qwest, Broadwing, Global Crossing and Williams Communications through its alliance with SBC have all said that they have a renewed focus on selling to enterprise customers. But that territory is also the territory of AT&T, Sprint, and WorldCom. These companies are all potential competitors of each other as well as customers. We don't think that these kind of mixed roles make for good business partnerships."

This was an approach that we really heard on from Vidal. We suspect that it is part of a repositioning effort by Level 3 as the ground continues to shift underneath everyone.

Customer Owned Networks, pp. 30-32

We reprint a portion of a 12 page paper by Timothy Denton. <http://www.tmdenton.com/pdf/Customer-ownedNetworksv1.2.PDF>

The paper is filled with valuable pricing on the cost of condo fiber builds in Que-

bec, Alberta and Ottawa.

"These networks have four characteristics that differ from legacy telephone and cable networks: · Customers own and control their wavelengths, and may trade them with other like-minded customers. · The network is an asset, not a service. · Creativity is derived from the end users, not the network managers. · The core of the network will not be optimally designed to minimize resource usage when end users have control; it will waste bandwidth." The paper is a good summary of the current Canadian state-of-the-art.

Spectrum is Not Property, p. 32

From a post to Dewayne Hendricks' tech list, very short essay by Robert Berger: Two essential points from the essay follow. "By making spectrum property today, we make it nearly impossible to create such an innovative broadband solution and only allow oligopolies to control our communications systems and thus the ability for individuals to form true peer-to-peer broadband services whose content is not easily controlled by the oligopolies and the government.

Please note that unlicensed does not mean un-regulated. The devices will have to still meet regulations for at least per hertz power levels and so on to guarantee that the spectrum is indeed being shared, not polluted.

ICANN Update, pp. 33 - 37

We further document ICANN's ongoing output of disinformation about its efforts to clamp down on and control the Internet.

Hague Diplomatic Conference Ends Poorly, pp. 38 - 40

"Today [Jamie Love wrote on June 20] the Hague Conference on Private International Law will end its first diplomatic conference on a new treaty to set the

rules for jurisdiction for nearly all commercial and civil litigation. In a world where everyone is struggling to understand how to address jurisdiction issues raised by the Internet, this new proposed treaty imposes a bold set of rules that will profoundly change the Internet, and not only that. As drafted, it will extend the reach of every country's intellectual property laws, including those that have nothing to do with the Internet."

Swedish Handbook on Fiber, p. 40

Like Canada Sweden is not leaving its future to the local phone company. They are committed to building a national fiber infrastructure and have just published a "cook book" describing their approach. We recommend that readers be sure to pick up the following document at <http://www.itkommissionen.se/extra/document/?id=347>

What Is and Is Not the So Called Digital Divide, pp. 41 -45

FCC Chairman Powell created some controversy a few weeks ago with remarks that were interpreted as not caring about the hallowed digital divide. On the Cyber telecom list on July 2 the question was raised as to whether Powell's remark should be taken as an insult to the good work of Larry Irving...

Dave Hughes responded to the discussion: "Larry Irving, when he headed up the National Telecommunications and Information Administration - NTIA - didn't do a damn thing when I handed him SEVERAL TIMES, on a silver platter, a major solution to cost-effective connectivity in rural areas - no-license wireless. Which NTIA could have, and should have, pursued. But utterly ignored - yeah, I mean Larry personally. And now still bleats about the 'digital divide.'" There followed a lively debate which we have republished above.

Within less than 48 hours Irving jumped in with the following comment where he

obfuscates the issue with an attack on Dave Hughes personality rather than on the substance of the technology.

Irving: "Let's not dismiss or deride efforts to assist the least fortunate in our society.

Now with regard to Dave and his continued rants about "his solution" to increased connectivity. I am sure that he believes that he has found the silver bullet for rural connectivity in the low cost wireless technology he opines about so often. Unfortunately, his view is a minority opinion. Yes, I spoke to him several times (in fact, innumerable times) about his views on how to bridge the divide. I passed on his views to my colleagues and to others outside of government. Most of us agree that Dave has an approach that may assist with the issue of affordable connectivity. There is by no means unanimity as to the merits of his suggestion. I am not a technologist or engineer. I am a lawyer and policy advocate. Like most people, however, I tune out when I hear the same song over and over, whether it is a classic like "Respect" or piffle such as "Sugar, Sugar".

I have no idea whether Dave is an Aretha or the latest incarnation of the Archies. I am, however, tired of his song and his insistence that he and he alone has the right answer. Now that I am out of government, I feel no obligation to listen to Dave's tune over and over again. So, I can and will just tune out his particular station.

Dave, the administration has nominated a new assistant secretary. I hope she provides you as many opportunities to express your point of view as I did. One suggestion. People are more likely to listen if you avoid the self righteous, condescending ad hominem attacks. Lets make that two: Hyperbole and bluster do not go over well at a first meeting either.

I do, however, want to thank you for reintroducing me to Hedy Lamarr. Because of you I now know that she was a very successful technologist and not just a 40's actress and one of the best tag lines in "Blazing Saddles..." Larry"

Dave Hughes replied: "Well, Larry can say he 'tunes out' my repeated assertions that no-license wireless can go a LONG way to bridging the rural 'digital divide' - but then having never tried it - even funding with the NTIA funds a serious field test of the proposition - he hardly can say it won't work. As he admits he only sought the 'opinions' of others. The difference being, I go do it, try it, and see how well, or not, it works. And I have always aimed PRIMARILY at, and reported on, the very disadvantaged communities Larry says he champions. What I have championed, works. Period."

Why I wondered did Larry Irving lash out with such disdain? A look in Google under Larry Irving's new consulting company (the Irving Information Group) was instructive. It seems to me that digital divide is about MARKETING and sales of IT hardware and software. It is about getting all American to use PAID services. It is NOT about no cost telecommunications services promoted by Dave Hughes. Consider the following excerpts from Business Week.

News: Analysis & Commentary Business Week, December, 20 1999 By Roger O. Crockett
<http://www.dmeinteractive.com/about/bizweek.html>

"Commentary HIGH TECH'S BIG MARKET? TRY THE INNER CITY"
"For years, policymakers and concerned members of the high-tech community have spoken of a digital divide-between technology haves and have-nots. But despite their concerns, the niggling disparity persists. If that doesn't change, the cyber ride that is propelling the U.S. economy into the next millennium could sputter. Indeed, if the technology revolution leaves low-income Americans behind, all of America will suffer. [Snip]

But more discussion of the problem isn't going to help. Nor are the welcome and generous gifts of computers and other gear that tech companies routinely make to inner city schools, libraries, and other institutions. What's missing is a committed effort to sell computers to these for-

gotten folks. Nothing fancy. Just a nicely targeted marketing campaign, and maybe a few inner-city stores, to demonstrate the benefits of the Internet. Simply put, companies ought to make the same investment in inner cities that they do elsewhere in the U.S. and overseas." [Snip] "Every white geek with an income of \$100,000 is online," notes Larry Irving, president of Irving Information Group, a Washington technology consultant. "The low-hanging fruit had been gathered." Now, it's time to do some reaching." So wrote *Business Week*.

The documentation of the forces that Larry has enlisted on behalf of fighting the divide - a term that he coined- is substantial. It fills most of page 44 and 45 above.

I conclude by asking: "What Interests Benefit?" Let's be perfectly clear about the meaning of the so called digital divide. Given the above evidence, we conclude that, for Mr. Irving, likely views it as a marketing opportunity to sell hardware and software and the Internet in the form of recurring monthly service fees. It looks to me like a mar-

keting opportunity for corporate America on whose behalf he advocates the use of public money to prime the pump for the extension of computer use and ownership. I dislike the approach because it seldom, if ever goes beyond the superficial attitude of "close the sale and move on." Dave Hughes vision on the other hand emphasizes understanding the needs of each community into which the technology will be brought. With such understanding comes a focus on training so that the infrastructure is used in ways that go beyond on line purchases. Most significantly Hughes seeks to give each community through spread spectrum wireless a way of owning as much of infrastructure as possible and obtaining connectivity to the net at the lowest possible monthly cost. When he asked Irving while he was running NTIA to back measures that would help local communities but not the local phone companies, Dave Hughes misunderstood the real purpose of NTIA's focus on the digital divide. Given the vehemence of his personal attack on Dave, I believe Irving decided that he could not afford to explain they way the system really works.

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