



# The COOK Report on Internet



## Building Tools for Edge Based Control Understanding Edge IPv6 versus Backbone IPv6 VoIP and Vonage - When Customers Become Competitors Open Spectrum Versus the Spectrum-as-Property Worldview

We are finding more evidence that the phone companies are caught in an undertow from which they cannot escape - unless the FCC and, or Congress does something truly idiotic like grant them a monopoly on fiber to the home. "Grant them complete control over the glass and then they will invest" will run the tired argument. The first problem is that they have pledged this before and done nothing. The second problem is that if they were given yet another opportunity there is and will be no enforcement for any of the pledges they make.

To borrow the metaphor from the 19th century, the result of granting them a fiber monopoly would be to hamstring the entire American economy into reliance on "canals" in order to scare off this new and chaotic world called "railroads." While other countries are building "railroads" - that is broadband - for us not to do so would irreparably handicap what is becoming one of the most basic infrastructures of a modern economy. We are already behind. The Organization for Economic Cooperation and Development (OECD) ranks United States only 17th in utilization of communication services. [Quoted in Feb 1 Pulver.com letter to FCC Chairman Powell.]

But fiber is fast you say and speed of connection is the issue - not control over access. What is wrong with such a scenario? Well consider the ZAP mail experience as written by Clay Shirky on

January 7, 2003. <http://shirky.com/writings/zapmail.html> What is wrong here is not speed of connection but rather control over the technology. The phone companies cannot see the world in any terms other than those of control.

### A Matter of Mindset -- ZapMail and the Telcos

Consider what happened to the hot new company Federal Express in the early 1980s. There was this new fangled device called a fax machine that scanned a document and sent the resulting digital bit map over a phone line. The time was just before the split up of ATT and the explosion of customer premises phone equipment. Fed Ex totally missed what was happening. Thinking that its competitors were the other over-night delivery companies, it spent 200 million dollars in an attempt to one-up them by buying expensive new fangled fax machines and building a dedicated phone network to run them on.

As Shirkey writes in his essay, they failed to see that the breakup of ATT and the consequent opening of the network would allow their customers to buy their own fax machines and by being able to use the PSTN, become their competitors. They underwent a huge build out for a business that wasn't there. With the network opened up, Fed Ex's customer bought thousands and then tens of thousand and then hundreds of thou-

Volume XI, No.12, March 2003  
ISSN 1071 - 6327

sands and eventually millions of fax machines. Rather than rely on Fed Ex for the faxing service, Fed Ex's customers bought their own fax machines and did it for themselves. Today rather than rely on centrally controlled circuit switched technology, increasingly large numbers of phone company customers are taking telecommunications into their own hands.

It is a simple matter of economics. The cost of communication via IP is but a fraction of the cost of doing it the phone company way. In our January-February issue we saw how the large corporate enterprises are beginning to pull their voice service from the PSTN. This issue examines why Ipv6 is unlikely to ever be significantly deployed in backbone of the Internet. It also will show how IPv6 deployed at the edge of the network, in the hands of the end user customers of the phone companies, could do a great deal to redress the ongoing consolidation of power into the hands of the central control minded tel-

### On the Inside Tools for Edge-based Telecom

Contents

p. 2

# Contents

<b>Building Tools for Edge Based Control -- Understanding Edge IPv6 versus Backbone IPv6</b>	
<b>VoIP and Vonage - When Customers Become Competitors - Open Spectrum Versus the Spectrum-as-Property Worldview</b>	<b>pp. 1 –4</b>
<b>IPv6 Going No Where - Political Push Fails to Propel Elegant Solution Lacking Market Pull - Former Drivers of Address Space, Device Addressing and Wireless Seen As No Longer Critical - While Very Important at Edge, v6 to See only Niche Backbone Deployment</b>	<b>pp. 5 - 13</b>
<b>Is IPv6 Necessary? - One Year Later</b>	<b>p. 10</b>
<b>IPv6 at the Edges -- IPv6 Seen Not as a Backbone or Transport Solution But Rather as User-Applied Edge-Based Overlay Supporting End-to-end Applications</b>	<b>pp. 11 -16</b>
<b>Two Internet Futures - With Edge IPv6 and Without Edge IPv6</b>	<b>p. 17</b>
<b>Customer Owned Networks --ZapMail and the Telecommunications Industry</b> by Clay Shirky	<b>pp. 18 – 21</b>
<b>Discussion of Clay Shirky's ZapMail Essay</b>	
<b>Unlicensed, User Financed, Edge Based Connectivity Technology -- Locustworld Meshbox in Context of Building Edge Based Wireless Transport</b>	<b>pp. 22 – 24</b>
<b>Open Spectrum - Property Rights World View Dies Hard</b>	
<b>Exploring the Problems with the Farber-Faulhaber Have-Your-Cake-and-Eat-it-Too Spectrum Arguments</b>	<b>pp. 25 - 30</b>
<b>ICANN and the Failure of "Self Regulation"</b>	
<b>How the National Science Board was Overruled by the Clique that Became ICANN - Part One</b>	<b>pp. 31 - 33</b>
<b>Governance by Lawrence Lessig</b>	
<b>Lessig Demonstrates How the Would Be "Self Regulators" Took Control - Part Two of How ICANN Came to Be</b>	<b>pp. 34 - 39</b>
<b>Interview, Discussion, and Article Highlights</b>	<b>pp. 40 - 47</b>
<b>Executive Summary</b>	<b>pp. 48 -51</b>

cos and cable companies.

We have been learning a lot more about the technology of VoIP. In our April issue we shall return to VoIP and shall show how new developments are already beginning to lower the artificially high costs of international phone tariffs. We anticipate writing about the technology and mechanics of the use of VoIP on a global basis as a substitute for expensive circuit switching. The cost spread between international circuit switched calls and VoIP calls which can be routed from one part of the PSTN to another is now so huge that it has spawned a global grey market. In part because so many people are so busy making money from it, this

grey market has never been discussed in detail in the press. Beginning with our April issue we shall do so.

The stark fact is that the blades of the VoIP scissors are closing in on the telco's cash flow. On the one hand one blade is the result of large corporations withdrawing voice traffic from the PSTN and running it over their corporate IP networks. On the other hand the other blade is derived from international VoIP wholesaling by companies like ITXC and activities by thousands of phone card middle-men hammering long distance rates ever downward. The ability of the phone companies to charge more for a minute of voice traffic than

they could for a minute of data traffic is rapidly diminishing. Recently the difference has been as high as seven to one. That is if a telco could make a penny for a minute of data transfer, it could make seven cents for each minute of voice transmission.

For the most part the seven-cent differential is no longer there. Bits are bits. One cannot really distinguish voice from data bits. That any price difference exists at all is increasingly a regulatory artifact. In two or three years market and technology pressures will have driven the differential to zero. When this point is reached, the telcos could find their revenues slashed by two thirds. They will

than have all the relevance of Zap Mail.

## Canadians Abandon Faith in Facilities Based Regulation

Meanwhile the regulators cannot keep pace. Testifying before the Senate Commerce Committee on January 14, Chairman Powell said "The Commission has before it a number of major proceedings that will attempt to improve and advance the goals of the 1996 Act. With the benefit of hindsight, we will be able to assess the last seven years and consider how we might improve the regulatory environment to more aggressively promote facilities-based competition, to promote major investment in advanced communication infrastructure, and to reduce regulation—all hallmarks of the Act." (p. 6)

As we showed last fall in our asset-based telecom issue (Vol. 11 Nos. 8 – 10), *the Canadians have essentially given up on trying to make facilities based competition work*. It is too bad that the FCC feels trapped in the requirements of the 96 Act. As Powell describes it, the FCC is in danger of striking out having taken two swings and failed on both occasions. The Canadians, realizing the impossibility of the task, have gone onto better things.

Powell has shown some interesting changes during the past year. Among them is a journey from saying that he didn't know what the public interest was to the following remarkable statement. "... we will be guided exclusively by the public interest, and resist the pressure to view our exercise as awarding benefits and burdens to corporate interest." (Page i). Of course the proof will be not in words but rather in actions.

On page four of his text he said: "In addition, broadband connections have also put pressure on wireline networks as many consumers that migrate to broadband for their Internet services have dropped their second telephone lines (which were used for dial-up Internet services). Moreover, 2002 saw the introduction of reliable Internet telephony services through a broadband connection. Companies such as Vonage are pro-

viding consumers with a direct substitute to their traditional wireline phones." "These various sources of competition have contributed to the first declines in total access lines for the four major ILECs since 1933 (the only previous year where access lines declined)."

## Vonage and Cisco

With his mention of Vonage, we can certainly see that Powell has more clue than he possessed a year ago. We are about to sign up for this service that for the first time takes a Cisco product (the AT186) VoIP gateway and treats it as a consumer product. The gateway plugs into the RJ-11 jack at the back of the phone and Ethernet into the cable modem in the back of the gateway. The result is unlimited long distance in the fifty states for \$40 a month – plus very attractive rates to the rest of the world. It is important to note that Cisco, as a device selling company and not a phone company, is well positioned to profit from the VoIP price scissors.

Furthermore those who have read the *New York Times* January 23 coverage (<http://www.nytimes.com/2003/01/23/technology/circuits/23sher.html>) of our work with Tsering Gyaltzen Sherpa will see another interesting aspect of what could be a new found Cisco view of the world. Cisco donated Aironet 350 radios to the Everest base camp project at Dave Hughes' urging. These are radios that Cisco markets to connect LANs inside of building in large corporations. Prior to this it seems never to have occurred to Cisco marketing people that these radios can be used to bridge a LAN to a VSAT at 5500 meters over a distance of two kilometers. The Times wrote: "Mr. Forster eagerly donated three Wi-Fi radios on behalf of his company. Such radios enable the creation of wireless networks that can relay data within a couple of hundred feet or as far as several miles as the crow flies, much the way that local-area networks, or LAN's, work in offices. "What I like about this project is that it demonstrates that the technology developed for a LAN in a building can be applicable beyond that," Mr. Forster said. "This may be as far outside the building as you can get."

For the first time Cisco is beginning to understand that these radios can be used not just on a corporate campus but rather can be used to replace the local loop in community based applications be it Nepal or in connecting community networks in Wales where Forster, at Hughes' urging, has also involved Cisco with positive results. Of course, if they work in Nepal, and in Wales, they will work in the US. Unless acting in ignorance and on behalf of the telcos, our political and regulatory system forbids it.

The bottom line of all these events signifies only one thing. The local telephone company's standard business model is dead. Rendered extinct by users taking control of inexpensive technology and using it for their own purposes. Because Cisco, unlike Nortel and Lucent, always had its major business outside that of the carriers and the ILECs, it is in the wireless and VoIP areas much better equipped to deal with the world in the aftermath of the death of the carriers than its more telco-oriented sister companies.

We signed up with Comcast Cable Internet earlier in January in order to install Vonage. On Monday January 27 we ordered the package. The question of selecting the Vonage phone number was not immediately clear although with hindsight it seems obvious. The service gives a separate phone line with its own phone number. We still have our 609 882-2572 number. Dial our new Vonage number 703 738-6031 and you will also ring our desktop phone. Moreover if you are in the Washington DC suburbs and 703 is a local call, dialing 703 738 6031 gets you through to us for a local call regardless of whether you are a Vonage customer. The Vonage web pages <http://vonage.com> did not have an 800 number listed for dial in. Frustrated. We sent email asking to talk to a real live human. Not five minutes later our phone rang and a very helpful resident of Connecticut who worked from his home as well answered our questions. We completed the order chose the Vonage phone number and were billed \$40 for the first month service, \$30 for account activation and \$10 shipping for the Cisco ATA 186 gateway.

The package arrived the next day. The only hassle was buying a two line phone (price range 30 to 60 dollars) and the right RJ11/14 connector. Installation was a breeze. Total plug and pay. Well almost. We signed up for Free World Dial Up and that does not work with Vonage. Why? Because the gateway is shipped pass word protected and to work with FWD a proxy IP number must be inserted.

The Cisco gateway retailing for \$200 and available wholesale at \$135 and "free" from Vonage is very compact. Roughly 6 inches by 6 inches and less than 2 inches high. Plug in the power cord. Plug in the RJ11 from the phone and connect an Ethernet cable from the gateway to our 8 port fast Ethernet switch (\$45). With line 2 on the phone set as the default (the VoIP line plugged into the gateway) pick up the phone and dial. The gateway has a large red light on the top that glows red when working.

The experience actually was totally plug

and play! It was not even necessary to open a network panel and configure an IP number for the gateway. Our Apple Airport Base Station did that transparently acting as firewall and router. They quality is excellent. Our first international call was to Arcady Khotin in St Petersburg, Russia. The cost was seven cents a minute. The same rate that we were paying ATT for domestic long distance.

## The Center is Dead

The center is dead. Forward movement is at the edges. The major focal point for this issue is IP v6. Farooq Hussain shows why its chance for significant deployment in backbones at the core of the Internet is effectively zero. However in a discussion with David Reed, Bob Frankston, Francois Menard and Farooq we are introduced to the concept of V6 at the edge of the network. We begin to understand how V6, in the hands of end users at the edges of the network, could redress the shift toward the center that has taken place in the balance of control

within the Internet. Indeed we have begun a fairly in depth exploration. It is not yet really clear what Microsoft will offer in order to make edge based IP v6 applications plug and play. Standards would help enormously. Five to ten years ago the IETF would have been the place to turn. Today it might be the IEEE.

Or it might even be the Consumer Electronics Association. At some point, we hope to offer input from Virginia Williams who is active at CEAI in leading an effort to enable whole families of devices plugged in at the edges of IP networks to find each other. In a conversation with her on January 30 we learned that there are several consortia of companies within the consumer electronics field that are exploring a range of issues that could be described as loosely related to Edge Based v6. We hope to describe these efforts in more detail in a future issue.

### Editorial Calendar

In the next issue we shall return to Voice over IP. In the one after that we likely shall do a reprise of asset based telecom which is now going global in major ways.

# IPv6 Going No Where - Political Push Fails to Propel Elegant Solution Lacking Market Pull

## Former Drivers of Address Space, Device Addressing and Wireless Seen As No Longer Critical

### While Very Important at Edge, v6 to See only Niche Backbone Deployment

---

---

#### Highlights

**Editor's Note:** Farooq Hussain was the Principal Investigator for the Sprint NAP and moved shortly after the NSFNET transition from Sprint to MCI joining the team directed by Vint Cerf. He left MCI just prior to the completion of the merger with WorldCom having worked on both the merger plan with BT and subsequently WorldCom for the Internet components of MCI. He was with AGIS for a little over a year helping to establish a business relationship with Telia of Sweden who subsequently bought AGIS out of bankruptcy. Currently, he is a partner in a research and consulting firm Network Conceptions together with Phil Jacobson [also an ex-MCIer]. We interviewed Farooq on January 3, 2003.

#### Is IPv6 a Deployable Protocol?

**Hussain:** IPv6 and the question its deployment is wrapped up in a series of quite complicated tensions which are difficult to articulate. My interest is in focusing on the policy issues that surround it as well as the lack of any reasonable way to determine what the commercial value of deploying it would be. There are two camps. One says IPv6 is not needed and won't happen and those who say it is absolutely necessary and will happen. These diametrically opposed positions all stem from a very fundamental issue of where we are with protocol development.

Two years ago a major international carrier whose networks were certainly applicable to IP v6 commissioned me to develop an IPv6 strategy for them. (This carrier has operations in Asia, Eu-

rope and North America and is financially stable.) I hadn't paid a lot of attention to what had been going on with IPv6 before mid 2000 or so. Like everyone else I had been reading all the announcements that it was "about to happen" and my first inkling was that as long as it was about to happen, perhaps this client should be doing something about it.

At the time there were three or four large US Operators, most notably WorldCom and Sprint who were saying that they had v6 networks operating.

**COOK Report:** In the sense of test networks or were they really production?

**Hussain:** I believe the old vBNS had v6 going. You had in the engineering community a lot of tension between those who were strong proponents of v6. There was some middle ground among those who were not really bothered one way or the other while on the other side there were and still are some very very strong critics of v6.

There has been, from the very beginning, a considerable amount of tension within the IETF about the need for an approach to IPv6. Lying at the very foundation of an understanding of where v6 is going is the necessity of understanding the rationale for its creation back in 1992 - 93. Everyone said then that we were going to run out of address space. This concern about address space continues up to today to be stated as the key rationale for IPv6.

The reality is that the problems with the Internet protocol that v6 was designed to solve have been managed during the course of the intervening decade both without v6 being available and without it having become a convincing alternative

to the existing v4. Some critics now would say that part of the problem is that the whole goal of expanded address space is just propping up the established concept that every device reachable from the Internet needs at least one permanent layer-three address.

#### The Presumed Address Space Shortage

Ten years ago this was actually not such an unsound approach. We then had this idea that the car would have its IP address and that within the car maybe the air conditioning system and carburetor also needed their own IP addresses. Just as every house has a phone number, everything was to have its own IP address. But things have turned out rather differently. We are much more sensitive to devices and uses being session oriented. And having, as a result, temporary addresses.

Now we are looking at problems of the Internet in going forward a decade later and it will not necessarily be appropriate to say that what has happened over the past 10 years to the way that v6 has developed actually applies very well to the current situation.

**COOK Report:** In terms of current operational economic and technology concerns?

**Hussain:** Exactly! On all levels! But the difference of opinion in the engineering community is really substantial. Seen in this light we have had a parallel path of the pursuit of the development of v6 while, at the same time, IP Sec, MPLS, NAT all of these things, let alone the management of address space, have happened and, in their respective ways,

have extended the viability of v4.

**COOK Report:** And there is now a lot of infrastructure in place that depends on what people thought might be only temporary patches. These patches are in fact now turning into very permanent looking fixtures.

**Hussain:** Yes. As time passes, it becomes less and less appropriate to call it only a patch. I think that if you suddenly started telling people that NAT addressing is only a band-aid, they'd look at you as though you were more than a bit loony. It is here and working fine. When you get into these discussions, you have arguments that are about issues of technical and architectural elegance. People will look you in the eye and say but v6 was designed to have security as an integral component. It has auto configuration as part of its design. We know all this but if we look around we are forced to acknowledge that it still isn't here. It has a lot of nice "features" - yet people still are not using it.

**COOK Report:** Shades of OSI! It is the outlook that says I will promise you everything if only you are patient.

**Hussain:** It definitely is afflicted with bits of OSI. But the road to v6 started out in a fever pitch rather more like the march to Y2000 fixes because everyone was propelled forward by the idea that the exhaustion of address space would kill the new-born Internet. Also what may prove to be the most damaging thing for IPv6 is that governments have mandated its use. One might ask why on earth they would do this? Why would there be official political battles, at the national level on behalf of a communications protocol?

## Institutional Proponents of v6

The main source of institutional support for IPv6 now in the US is to be found almost exclusively within the Department of Defense. No one else really battles for it. But even then it is really difficult to say exactly how strongly DoD is really pushing it. Someone has made a deci-

sion to support it and, whatever the reasons for doing so, are not really completely clear to me. The other parts of the US government don't seem to care.

In Europe it is very strange to see that the European Commission is hugely in support of v6. They have quite a few initiatives, including a couple of major ones, on-going to push forward the protocol. Meanwhile Japan has long been in favor of v6 and indeed has become the one government to actually mandate v6. You have then a significant portion of the OECD countries in terms of their respective economic power who are in favor of v6. But looking at the over all situation, you must say that the US is not quite there. That Japan, from the government perspective, is totally pushing it. Europe is trying to push it and, in fact, there is an international alliance between the European Commission and Japan to endorse and promote IPv6.

But looking at all this official support you need to ask what is going on here? Is it not good enough to get adopted on the face of things? It is rather unusual to look at a protocol and proclaim that somehow it is the key to some economic power. Or that it will lead to some terrific economic advantage. It seems to me that this outlook is one that fights the last battle. It says that the US gained great advantage from IP v4 so let's try to gain comparable advantage from being the first with a replacement for v4.

I am not at all sure that this makes much sense anymore because the rational for v6 is about controlling and managing address space. Where you find the heaviest endorsement of v6 is where the routing registries have the most severe policies. Japan certainly falls into this category. APNIC pushes v6, but within APNIC, Japan pushes especially hard.

In the initial allocation of v4 address space, the claim was and remains that the United States allocated address space in such a way that certain countries were left very short changed.

**COOK Report:** If you had a Class A address block and many universities did and still do, you had more address space

than all of China.

**Hussain:** Quite true. Take therefore the Japanese position that Japan is very tight on address space and that it is required therefore to manage it very carefully. Consequently it is going to mandate the use of v6 because doing so frees Japan from any constraints imposed by the arbitrary nature of the way in which the initial allocations were made.

## The Position of Japan

In this context the most important paper that I would direct your readers to is one that they really should read before getting absorbed into the detail and finer issues of why v6 is in my view unlikely to be anything more than a niche protocol. This paper was published by Glocom in January of 2002. Its title is "Is IPv6 Necessary?" It is by Nobuo Ikeda and Hajime Yamada. See [http://www.glocom.org/tech\\_reviews/tech\\_bulle/20020227\\_s2/](http://www.glocom.org/tech_reviews/tech_bulle/20020227_s2/) The paper is well put together with a very balanced argument. But note also that it is from Japan!

The authors estimate that we are unlikely to run out of v4 address space for another 15 years - if ever. I haven't seen this paper really challenged. When I read the paper, I wondered what would be the EC reaction? Would the EC just quietly defuse its support? There has been an enormous push back from European ISPs who fear that they might be mandated to deploy v6 just as ISPs in Japan were. In Europe there is push back against the EC directive as well as all the hype that you hear for it. What I do see is that, in Europe, the conclusions of the paper are being wished away.

Since the Ikeda -Yamada paper is basically a research paper, the proponents of v6 breathe easier knowing that it won't fall into the hands of the trade press that goes on cobbling out simplistic arguments that we better hurry before address space is gone and the huge numbers of wireless users all of whom will have device dependent IP addresses arrive. All these assertions go unchallenged except within that core community that had serious issues with v6 from the very beginning.

**COOK Report:** The people with the issues are those who have v4 infrastructure in place, are running happily and do not want to have to make the huge investment in changing?

**Hussain:** Yes. But furthermore the huge investment in changing would require a rationale propelling the change. Why would we be making a huge financial commitment? What would we anticipate our return to be on such an investment?

If you have a large network and are required to implement this protocol, you can derive an operational or internal benefit. Or it can come because there is market pull. It is something that customers want. Now we have been told that customers will want v6. But the window of when customers will really want it has been moving outward now by 2 to 3 years every six to eight months.

## Window for Alleged Market Pull Keeps Receding

When I first started looking at this in the year 2000, the period 2001–2003 was going to be the big and explosive period of IPv6 adoption. Two years later we are looking at a period of somewhere between three and five years before there is any indication of a recognizable market pull in the wireless arena. Projected pull that is 3 to five years distant is something that is too uncertain to be a reason for us to commit to capital expenditure now. In short I think it quite safe to assert that currently, there is no reason to deploy v6 because of market pull.

There are ways to implement v6 as tunneled within v4 within a backbone network. You might consider doing this as a means of gaining experience with it as a protocol. Most players out there who say they have v6 are implementing it in this sort of marginalized way. When you look at what operational benefits are to be gained by turning a backbone network at the Internet core into an IPv6 network, there are really precious few. To turn a backbone network into a v6 network, there are actually quite a few levels of

complexity to undergo. To arrive at v6 you will need to do serious levels of protocol translation at the edges because obviously all but a negligible fraction of your traffic will be originating and terminating as v4. From an operational standpoint, as a large network, saying v6 does this and that better than v4 for me makes no sense because no such a network lives in isolation from the Internet. You have to be dealing with v4 anyway and what you end up with therefore is in effect a dual direction that is now being pursued.

So where are we now? I would say that v6 is a pretty solid protocol. There is a lot being done to address transition. Most of the key core router manufacturers – Cisco, Juniper – and a couple of others such as Hitachi have announced releases for v6. They are basically offering their routers with dual stacks. Networks that deploy v6 will be doing so with dual stacks. This means that you will have v4, v6, MPLS, and must have a dual stack DNS - in short you will have a lot more complexity to deal with. Heading in this direction does not mean that you have chosen a path to operational efficiency and cost savings in the core of the network. But in tough economic times this is the direction in which everyone must head.

**COOK Report:** Well suppose a university wanted to operate v6 only on its campus? But even doing it just on its own campus would increase the cost of operation?

**Hussain:** You have to ask just what it is that they would gain from v6? Do they need to run v6 because they don't know how to do NAT? Or because they won't have enough address space? When I was evaluating v6, I found a very ambivalent position on the part of educational institutions. The 6 Net that has six or seven hundred institutions is hosting the networks in general of small research departments. I really don't think that these departments are representative of the campus network of the entire the university.

The bottom line is that we are having a problem in finding a commercial rationale for deploying v6 solely on the justifi-

cation that it is more elegant than what we have as an alternative. The debate between elegant v6 versus plain old v4 is beginning to bear the marks of the disputes of MACs versus their PC brethren. There is precious little that v6 a decade ago was designed to do that cannot now be done in other ways. You can almost certainly say that there are some things cannot be done with v4 in ways that are as elegant as those to be afforded by v6. The problem was that v6 has simply not been there for other purposes because its whole design rationale had been driven by the warnings of v4 address space exhaustion.

**COOK Report:** All the talk was of the 60 MPH collision with the brick wall which because of Cider and DHCP didn't happen.

**Hussain:** Don't forget NAT. All of this has become part of a fabric that is global in scope. If you now try to envisage a transition to IPv6 set against this existing installed infrastructure of v4, I think the Glocom paper not sarcastically suggests that it will take centuries. If there was some market pull, one might say there is a rationale for it to happen.

## Isolated Rational – Wireless 3GPP

I think the rationale for IPv6 exists only in very small isolated cases. Let me look at them by putting the small isolated case that is the most contentious of the lot first. Wireless. The wireless environment has really had a number of interesting twists and turns. V6 has taken a decade to declare that it has solved the address space problem by essentially giving everyone infinite space. But in parallel our way of handling address space has become so good that we no longer need the solution that v6 has labored so long to achieve. It is very unclear that we have an address space exhaustion problem that cannot be managed. Moreover we have managed it quite well so far.

The other issue is why does every device need an IP address and the conclusion is that it probably doesn't. So put these two things aside and look at what you have. You have networks that are carrying

IPv6, IP SEC, MPLS and Ipv4. My contention is that in the future IPv6 will be the smallest niche component of this traffic.

**COOK Report:** But once upon a time wireless devices were going to need fixed addresses. Do we now have the equivalent of DHCP for wireless?

**Hussain:** I think the situation about wireless is fundamentally unclear and quite contentious. 3GPP, which is the third generation mobile project, adopted IPv6 as their protocol of choice in 1999. In doing so they probably gave v6 the strongest endorsement that it has ever received. It claimed that each cell phone would have its own IP address and that there would be billions of handsets. The requirement for using IPv6 to handle such addressing issues seemed to make a lot of sense. But there were a couple of problems.

**COOK Report:** For one until a cell phone becomes totally digital it doesn't need an IP address. Right?

**Hussain:** Correct. And furthermore they may never get to that point because there is something else going on with the wireless operators in terms of their selecting v6 as a protocol. The mobile operators and certainly those outside the United States have been very pleased, and rightly so for that matter, in terms of their ability to establish mobile roaming. When they approached third generation roaming requirements for data, it was their intention to have a third generation wireless network run as an IP network. But their idea was there would be the old Internet and a new 3GPPInternet with its own addressing and its own domains. If you want to send traffic to it (3GPP) you would have to connect to it and peer with it.

There was a moment in time during the height of the bubble when for the blink of an eye you might have said "my god these people are trying to compete with and over take the global Internet with one of their own construction!" They simply didn't seem to understand the most fundamental points of what they were dealing with in terms of the Internet. On top

of all this, at some point the mobile operators decided to have a competition to establish exchange points for mobile Internet operators that were also delivering other kinds of Internet services.

If you were an Internet operator you could have an exchange agreement. (Cable and Wireless, the Amsterdam Am Six, Sprint were among those involved.) A whole bunch of mobile operators got into this group that was interested in creating exchange points. These mobile operators were trying to create an insulated domain that was outside of the management of the routing registries. The efforts never really took hold. No body complained about it but also nobody pointed out that it was really a very flawed approach.

**COOK Report:** They were adding another layer of complexity.

**Hussain:** If mobile Internet had actually started to take hold, I think they would have seen a problem of huge dimensions.

**COOK Report:** Why?

**Hussain:** The exchanges we have now are just hanging on. Segmenting the market further into exchanges for just mobile operators would not I think have made much sense. I think there were factors at work here beyond just ones of getting IP connectivity to your cell phone that had slowed up and disrupted things in the mobile market place. This slowing and disruption was I think a fortunate side effect for those of us concerned about the Internet's strategic direction.

So now what we actually have to ask is whether it will be 2007 when 3GPP starts to happen and we are all going to have to be ready with V6 because this is the kind of forecast date they are asking us to look at right now.

**COOK Report:** But if we have software radios coming on line right now by then we shall have software defined cell phones.

**Hussain:** Exactly. At the beginning of 2001 they were talking 2005 at the beginning of 2002 they were saying it was

going to be 2007.

**COOK Report:** By 2005 your cell phone will sync to other cell phones in the neighborhood and likely be able to figure out what kind of address grid it is in. In this sense a geographical addressing system could become possible?

## **No Impact Before 2007 But by Then Whole Nature of Wireless Will Be Changed**

**Hussain:** Exactly. Other than this belief that we are going to run out of address space, the only rationale for v6 is that we are some how going to have billions of mobile users whose operators are going to need v6. My analysis of this has brought me to the estimates of others that claim by 2007 mobile requirements could make an impact. The problem is that by 2007 there will likely be enough other changes in the way mobile works such that no one else will want these IPv6 related capabilities.

**COOK Report:** Because there will be other better and cheaper ways of doing it?

**Hussain:** And these are already showing up now. The compelling arguments for v6 are based on two things. Address space considerations and mobile developments that might represent an uncontrollable growth problem that would exacerbate the address space issue.

**COOK Report:** If Powell carries the open spectrum reform forward, history may show that it was this effort that rendered IPv6 unnecessary.

## **SONY Proclaims v6**

**Hussain:** Precisely. However, here is a final issue. About 18 months ago a high SONY executive declared that all future SONY devices would be IPv6 addressable and warned that all service providers had better deploy v6 to be ready to take advantage of Sony's roll out.

The problem is that even if SONY's strategy were to work, those v6 devices

would have to talk v4 as well because all networks will never convert over night. In order for the device to operate however the protocol must be transparent and it will have to work as well on v4 as on v6. You are just adding another level of complexity with no real payoff since if it will operate v4 there is no real need for it to operate v6.

**COOK Report:** So even if the networks were impressed enough to start investing and even if they had enough cash to do so (which they do not), the issue of added operation complexity would suggest that they don't go forward with v6?

**Hussain:** Yes. In a couple of years you will see all the major core routers with dual v6 and v4 stacks. You will be able to serve customers by setting up v6 tunnels inside of v4 for those customers which for some reason or other just have to have v6. You could also use MPLS to set up a native v6 PVC. But the aggravation to do this is extensive and even if it were cheap, the idea that your engineering team will be eager to rush out and embrace v6 just isn't likely.

We may well be faced with quite an irony if we are faced with the need to run two versions of IP on the internet – v4 which will likely never go away and v6 for which there may be a few niche markets? IPv6 was intended to replace v4. It is unlikely that it will ever achieve this goal. But it certainly has its advocates and its niche applications. Given the current direction in which we are going we will not have a permanent address for every device as envisioned in v6. There could be some circumstances that include the possibility of a global 3GPP network that insists on having fixed IP addresses for every device dependency. So instead of one IP protocol to be managed you will

now have two.

One has to ask whether the purported benefits – address space, security and auto-configuration are worth it. Do these benefits outweigh the aggravation of having to manage two versions of IP in the network? In other words IP Sec would be nice, but if the cost of getting it on a meaningful scale is a multi billion dollar global reconfiguration program, are there other less expensive ways of ensuring security? The answer is very likely yes.

## Still No Market Pull

**COOK Report:** At one point a good v6 stack in Windows was supposed to bring on the v6 revolution?

**Hussain:** The irony is that a lot of people have now come out with good v6 stacks and the existence of these stacks isn't doing anything for anyone.

**COOK Report:** Once upon a time you were going to use SIP to be able to turn on and off your home air-conditioner. Now however the air-conditioner and a bunch of other stuff sit behind your home firewall and you don't want it to be universally addressable?

**Hussain:** That is about where we are. These applications are suggested as things that are doable with IPv6 but they are not market driven applications. There is no evidence that there are large numbers of folk out there who want to do this.

**COOK Report:** At one point people were complaining about firewalls holding back end-to-end v6 capable architectures but if we didn't have firewalls out there protecting our cable modems from Klez

worms what would we do?

**Hussain:** Exactly! There are pluses and minuses on both sides but from the perspective of a network operator the worst of all worlds is emerging in that they know that they will have to deal with v4 for the vast majority of their customer and transit traffic but that there will also be certain circumstance in which they will have to envision carrying v6.

They will have to manage both and they may or may not make a decision in a couple of years time that their core network would be v6.

**COOK Report:** Is there any reason why they might go to v6 in the core?

**Hussain:** Only because they routers are already enabled and they could do it without having to spend any significant extra money. Doing it would increase costs and add complexity and in the absence of market pull it is unlikely that they would do it. Right now I don't see a pull.

DREN did exist as a defense research network run originally by ATT. They lost it and Global Crossing had picked it up. But when Global Crossing went bankrupt more than a year ago WorldCom having had in the vBNS experience in playing with v6 won the contract. But the only market pull here is coming from the US DoD that, as I said earlier, is the only substantial advocate for v6 in the USA. DoD might indeed want vast numbers of devices with fixed v6 addresses. But the DoD's requirements are likely to have a military rationale and not one that will translate into creating a broad commercial market pull for the general implementation of IPv6.

# Is IPv6 Necessary? - One Year Later

---

---

**COOK Report:** We asked Nobuo Ikeda, one of the authors of "Is IPv6 Necessary?" [http://www.glocom.org/tech\\_reviews/tech\\_bulle/20020227\\_s2/](http://www.glocom.org/tech_reviews/tech_bulle/20020227_s2/) to give his opinion on the subject of his paper a year later. He replied

**Ikeda:** I suggest you ask comments from Jun Murai, the global leader of IPv6. He and I discussed this problem in a recent IETF meeting and agreed that the problem is not the "shortage" of addresses but rather applications to take advantage of v6.

**COOK Report:** May I send him your suggestion?

**Ikeda:** Yes, but I'm not very much interested in v6 because we have reached a conclusion. Yet it's important to make it clear because there are still many people who believe in v6 without knowing it. Our paper on IPv6 was downloaded by 17000 people last year.

**COOK Report:** In other words v6 is dead?

**Ikeda:** I think it is still alive as an ideal.

As Larry Lessig emphasized in his book "The Future of Ideas", it was the E2E architecture that made possible the explosive innovations on the Internet. But today it has drifted far away from this principle. The Internet is complicated, opaque, and controlled by service providers. Can we take it back to the E2E ideal? I'm not optimistic about that. Today, five years after RFC 2460 that recommended IPv6, the number of v6 sites has increased to 1259 from 1046 in November 2001 - about 180 sites per year among more than 40 million sites on the Internet. How many millenniums does it take to replace v4? See <http://www.cs-ipv6.lancs.ac.uk/ipv6/6Bone/Whois/index.html#full>

Some people argue that "ubiquitous computing" requires IPv6. However, it is not v6 but Auto-ID that is prevailing as the international standard for RFID. And I don't think it would be so ubiquitous as they imagine. Indeed NAT is ugly, but it protects average users from direct attacks on their IP addresses. We even don't receive e-mail by E2E. It's the reality of the Net whether you like it or not.

The cheapest way to recover the E2E would be to reallocate v4 addresses of which only 3% are used. I recommend that ICANN to have "address buyouts" to buy back idle addresses by reverse auctions and sell them through auctions. [Editor: Not trusting ICANN, we are glad that the chances of this happening are quite remote. But as a general principle we see the point that Ikeda makes.] I proposed a similar mechanism for opening spectrum in my article "The Spectrum as Commons".

<http://www.rieti.go.jp/jp/publications/summary/02030001.html>

Indeed the problem with IP addresses is similar to that of the spectrum "shortage". In fact, spectrum is not running short; it is only monopolized by incumbents who can't use it efficiently. Internet people are accusing the incumbents of stifling the innovations made possible by new radio technologies. I would make a similar accusation for MIT, Apple Computer, Hewlett-Packard, and other organizations that each have more addresses than all of China.

# IPv6 at the Edges

## IPv6 Seen Not as a Backbone or Transport Solution But Rather as User-Applied Edge-Based Overlay Supporting End-to-end Applications [Highlights](#)

**COOK Report:** Asking for comments, we sent the Interview with Farooq to Bob Frankston (one of the developers of Visi-Calc), and to David P Reed, and Francois Menard whose names should be quite familiar to our readers.

On January 20, 2003, **Bob Frankston** replied: It's very important to distinguish between V6 at the edges and V6 in the backbone. The reason that V6 is not currently available is that those who are the guardians of the net -- the backbone people are just worrying about their internal issues and there is no concept hereof actually using the network.

Here is what I wrote last summer: Edge Protocol (EPv6) rather than IPv6 [http://www.satn.org/archive/2002\\_06\\_30\\_archive.html#85208157](http://www.satn.org/archive/2002_06_30_archive.html#85208157)

I recently (June 21st, 2002) spoke at the IPv6 (Internet Protocol version 6) summit (<http://www.ipv6summit.com/ipv6-program.html>). I was invited to speak about the issues raised in my essay on the Importance of Encrypted IPv6. In that essay I pointed out we need to assure that every system connected to the Internet has its own (IP) address so that it can be a full peer participant. Encryption is important because the separation of the application layer (TCP) and the transport layer (IP) has been weakened by providers who are second-guessing the traffic on the network.

Despite the urgency there are many who wonder if we'll ever be able to make the transition from IPv4 to IPv6.

The answer is "no" because that is the wrong question. The idea of transitioning the entire Internet to a new protocol represents a failure to understand that the Internet has thrived because it is defined by its users rather than by a central authori-

ty. IPv6 has been designed as a protocol that tries to meet the needs of the user (application) layer and the transport layer at the same time. While IPv6 does a reasonable job at meeting both requirements the deployment model is seriously flawed because it ignores the dynamics of the Internet as a marketplace driven by the needs of each user. [snip]

IPv4 (or just "IP") represented the birth of the Internet by shifting the power to define the network to the users at the edges.

*The Internet has thrived because supply is driven by demand. New application services are supported by simply providing more transport (or IP) capacity. Rather than wait for new capabilities to be defined, users will create their own solutions.* (When I say "users" I don't mean all users create applications. It only takes one motivated, creative individual with some time on their hands to create an application that will be adopted by millions of others. We just don't know which user that will be.)

[snip] The solution is severing the dependency upon IPv6 as a way to meet the needs of the transport layer. Instead we need to focus on the requirements at the edge of the network.

### Edge Protocol 6

I'm proposing a new protocol called Edge Protocol 6 to give us the benefits of the larger address space and simplicity. It gives us the ability to make immediate use of IPV6 technology at the edges using the Internet as-is.

We must not lose sight of what is really important, namely recovering the simplicity of the Internet by giving each end point a public presence. By implement-

ing security between end points not only do we have a chance of understanding what is happening, we can also choose our own policies. Barriers between systems (including firewalls) seem more focused on fear than on allowing organizations to create value.

There is no requirement that the edge protocols and the transport protocols be the same. It should be consistent and convenient to leverage common formats. Those of us at the edges have already paid a high price in waiting on those of us who are tweaking IPv6 for use within the backbone for the Internet. This continues to be a dysfunctional dependency. We must learn from the success of the Internet itself and treat the relationship between the IPv6 and what I am calling EPv6 as similar to the separation of UDP from IP or IP from Ethernet packet formats.

Though this is really Edge Protocol version v1, I am calling it v6 for marketing reasons and it looks a lot like IPv6. The big difference is in the requirements. We can deploy EPv6 on the existing IPv4 Internet now. Not only does this avoid dependency upon unmotivated service providers, it also allows us to ignore those who are trying to build out an IPv6 network since we shouldn't care whether their efficiencies come from adding capacity or clever protocols. In fact, we should discourage any cleverness in favor of just adding capacity.

### Key EPv6 Characteristics:

- Supports a larger address space. Addresses can be composed using the existing IPv4 addresses as a prefix so we can use the existing infrastructure.
- Address resolution can use the existing

IPv4 DNS Entries (A records) as well as the newer AAAA (IPv6) records. Thus I could say "rmf19.myhouse.frankston.com" where "myhouse.frankston.com" is a V4 address part.

- Connections are assumed to be encrypted in order to discourage favors from those who are fixated on "efficiency" and other meddlers.

- While there are elegant approaches to the problems of NATs (those routers you buy for your home), EPv6 implementations can even fall back to TCP tunnels. The advantage of TCPis that it maintains a connection through NATs but the disadvantage is that it can impose arbitrary delays and overhead. From a marketing standpoint, however, it means we can use EPv6 without changing the NATs and that can create a demand for better solutions. The risk is that the pain won't be great enough to force a change but that isn't all that bad.

- EPv6 is meant to enable new applications. Transitioning existing services is a secondary priority though being able to access EPv6 web sites from older systems is important but can be done at the application level.

The Internet has been seriously weakened by the need to share IP addresses among a set of computers. We're ten years overdue on remedying the situation. The availability of EPv6 is a key part the rebirth of the Internet. The P2P (Peer to Peer, including Instant Messaging and other collaboration tools) community already represents a significant pent up demand that is ready to catalyze around a commonly accepted way to provide a large address space with direct connectivity between systems at the edge of the network. The use of encryption helps assure that the connection is indeed direct.

Transport providers who do want to take advantage of the IPv6 addresses to simplify routing will also benefit by having a demand for their services. The process will start by building on IPv4 but the ability of EPv6 will also make it easier to meet the demand using IPv6. IPv6 with-

out such a demand isn't very interesting.

## V6 in the Backbone and V6 at the Edge is Entirely Different

On January 20 **Bob Frankston** reminded us in response to the IPv6-in-the-backbone focus of our interview with Farooq:

The purposes of V6 in the backbone and V6 at the edges do not have any relationship whatsoever. Period. No qualifications. This has lead to the tragedy of the misperception of a commons. The backbone has indeed accommodated itself to V4 since trying to address each atom on the net individually is a very big problem and unnecessary. The IP "address" is like the circuit ID in the phone network and it encodes a routing though not necessarily a precise one.

V6 in the backbone has become a feeding frenzy for those who miss the PSTN and want to bring back QoS (AKA discrimination in favor of legacy traffic and to justify maintaining scarcity) and MPLS (circuits are forever). There's also the bad idea of providing mobility at the IP layers. (Yes, saying this is in conflict with complaining about temporary IPaddresses but that's a longer discussion).

There is indeed no market pressure form the sheep at the edges so there is no way ISPs will make it a priority and waiting for them is pointless. The reason we need addresses at the edges is to give every end point a first-class public presence on the net with a modicum of stability. NATs, and VPNs and Firewalls have already destroyed the Internet replaced it with a series of walled realms that don't trust each other and are constantly being invaded. Each invasion is seen as fatal thanks to the Maginot line mentality.

EV6 rides very well over the V4 network (modulo NATs) though native implementations would be nice. V4 tunneling does have its issues. The reason we don't have V6 is that it is a repeat of my experience with home network. I am not around to harass the network people to make sure they get rid of excess baggage and recognize a "just-do-it" mentality as

a priority. This includes being willing to do whatever it takes even if that means using TCP tunnels through recalcitrant NATs until they can be brought into line. Efficiency without connectivity is a form of death. It's also vital to address other issues like working with the existing V4 DNS and extended it with dynamically finding local end points.

And, of course, the edge users must have encryption because of all those bell heads lurking around trying to impose their terms of service and other forms of smart-assed meddling.

Converting the Internet to V6 is a bad idea. It must be adopted at the edges to meet needs and can coexist just fine with the old Internet. New apps can thrive. It probably makes sense to have some V4<=>V6 http but for the most part you want to go to a v6 server you must have a v6 client

In your newsletter it is vital to distinguish between EV6 and BV6. Backbone V6 is not at all interesting to me though some of your readers may care. As long as BV6 is an opportunity to bring back dead ideas, however, it may actually make the net worse. Steve Deering agrees that the ideas are bad though I don't know if he'll agree they make the net worse. In short the lack of EEV6 (End/Encrypted) V6 is a definite liability for those of us who want an end-to-end edge controlled network that I open to innovation.

**David P Reed:** Bob doesn't need me to agree with him. His points above are dead on, and in many ways put more succinctly than I would be able to.

## Needed: an End-to-End Overlay

My only amplification would be that those of us who see no need for BV6 or a twisty convoluted web of walled gardens with trolls at all the gates may need to revolt, and do an end-to-end overlay network of our own (just as the original Internet was an end-to-end overlay network). When is a revolution necessary? When the current market leaders keep building instruments of control -- like NATs, like usage policies that bar certain

kinds of uses, and like attempts to charge merchants a percentage on every transaction on the net -- rather than what the users really want.

**COOK Report:** How can the users at the edge install their own IPv6? How do the users revolt? What is the cost of doing so? What can users do on their own? What do they have to get an ISP to do?

**Frankston:** Let me start with the idealized answer -- the one I believe would be the case were I still at Microsoft. It's the same as the one for home networking. It would "just work". In fact, there is a V6 implementation in XP right now but it is missing key "just work" elements:

- (1) It doesn't try to "just work" and you have to do all sorts of setting and tweaking. The .Net server version doesn't seem much better.
- (2) It requires a cooperating NAT and ISP for type 41 packets. It should support various alternatives even if they represent large performance hits.
- (3) It doesn't do encryption well or automatically or universally and confuses encryption with authentication.
- (4) It doesn't allow me to simply use my V4 DNS.
- (5) It's concerned about transition instead of simply giving me V6 capabilities.

None of this is fundamental.

To oversimplify, V6 is simply a 128 bit address. It is typically divided into a prefix portion and a local portion. One of these is reserved for a particular way of using the V4 address as a prefix but it's possible to define additional approaches. The local portion is arbitrary and can be based on the MAC address, for example.

There are some difficulties:

The tunneling packets are a different type so may run into barriers. There is no reason for this to be necessary. Since it is a different type of packet you can't just tell your NAT to forward the packets to a given port. There lots of ways to name a machine and you can have global prefixes and local only. Making sure you have the right one for the return path is a challenge. It's not clear why this has to be a problem but there seems to an effort to have special addresses. One reason is to

keep the local addresses constant even if your ISP connection flaps but you then have to make sure you know the purpose of each address in order to expose appropriate. I don't see that this should be a big issue but it adds complexity in explaining things to users and forestalls "just works" unnecessarily. Encryption without pre-arrangement. I presume it is very doable but haven't drilled down. Local and dynamic DNS -- not sure if the protocols are in place

But none of this is a killer. Roll your own? Sure. The problem is getting someone with the right time and expertise to do it. In the MS world everyone is waiting (and waiting) for Microsoft. Linux/Unix? There's no telling.

I think the first step is to simply get the backbone and edge agendas separate and then we can make some progress. Too few people understand the Internet and just treat it as a telephone-like shopping network. There is no pain because legacy apps work and few people see beyond the capabilities of that past. The one middle ground is to write apps for V6 and then go over V4 as an accommodation instead of thinking "V4"

**Farooq Hussain:** I certainly have no issue at all - rather I'm in agreement - about making a distinction between the value of deploying v6 at the Edge (Ev6) and the deploying it in the backbone (Bv6). There are definitely reasonable rationales for placing emphasis on the edge deployment and good reasons to stay away from Bv6. But assuming that Ev6 gathers some impulsion in the years ahead, Backbones will have to route v6 support http v6/v4 and v4 to v6 and vice versa aside from the necessity for dual stack DNS.

The points that I was trying to emphasize with Gordon were that:

- (1) v6 should stop being viewed as a replacement for v4 particularly on the grounds that there will be address space exhaustion.
- (2) Having 2 IPprotocols on top of all the rest that happened to backbones is both painful and inelegant, but not necessarily

commercially or operationally unworkable. Just at the moment, its really hard for me to see what would commercially motivate any carrier to deploy v6 other than sensible forward positioning at a very low level of commitment.

(3) I certainly agree with the comments of David and Bob that the Edge has more value, rationale, and probable commercial viability than Bv6 at this point. Still we'll need to understand the kind of commitment that Microsoft is willing to put behind v6 as well as others like Sony for example. I'm not sure that I grasp the picture of the grass roots "brush fire" that might accelerate the promulgation of Ev6. I fear that Ev6 is caught in the same grip of conflicting government policy, giant multi-national enterprise, and other institutional interests. If Ev6 can make a compelling case for adoption based on a business/commercial rationale, this - based on the points David has made earlier - applies to a different segment of the market than that of the backbone carriers though they will be impacted by it.

**Frankston:** Just to avoid ambiguity -- the E in EV6 means EdgeV6 or Encrypted Edge V6. I presume the government policy question is about Encryption and, at this point, I would make a strong case that an enlightened government would push strongly in favor encryption -- were we to have an enlightened government. Encryption is merely like expecting people to take responsibility and lock their own doors rather than saying only police are allowed to have keys.

## Role of Microsoft

The reality is that much of this depends on an enlightened Microsoft and, to be very very specific, Christian Huitema. He's doing everything "just right" but I haven't seen a sign of his going beyond that and separating edge from backbone requirements and emphasizing encryption and edge deployment.

When I worked there well before Christian joined the company there was no awareness about making Internet connectivity simple and I see that as my main accomplishment. Nevertheless, it's still a very difficult idea to remain faithful to.

Consumers never asked for home networking and they are not asking for V6. They are asking for higher and higher firewalls and, as you can see from the MSN ads, they want only bits with good intentions to be allowed through. Consumers are still asking for more and more broadband for browsing and not for sharing.

As to http v6/v4, I would argue that too is entirely edge. Those who care to listen on both Internets would have dual ported servers. The big public servers like CNN will do that, especially if they are strongly encouraged and the Microsoft IIS and Apaches do it automatically. The old V4 servers will still be accessible to all systems since I don't expect the V6 systems to drop V4 client support even if they don't have a public appearance. I don't mind the NATs as a legacy accommodation -- the problem is there is no alternative.

Bv6 is then freed to give more routing flexibility. In fact one can run V4 over a V6 backbone or visa versa. It's just an internal design issue. But why bother with Bv6? To the extent that Bv6 is a better route description than using a native prefix, then you might as well use it. But if the routing portion is really only used to get you to the a Ev6 connection point, then it's not as vital. We would greatly reduce the pressure on the address space.

There is one big problem in my nice story. I don't like the notion of a single level of V4<=>V6 switching. There is a point to which the V4 prefix takes you from where you switch to your local v6 router. One can nest additional routing internally so you can cascade but the bit layout story isn't as clean. Still, even with that caveat, we must get started and give every system a public presence and, with encryption, bring the meddler-free Internet.

Next we can start teaching people that an Internet Access Provider and Internet Service Provider are unrelated functions and just because ATTBI changes its name to Comcast is no reason to change their email address. But that's the dotDNS agenda and more.

**COOK Report:** On Friday January 16 I had Comcast cable modem service installed. However my mail comes from fast.net. Fast Net also does my DNS service for cookreport and hosts my web site. Therefore Fast Net is my (Internet Service Provider (isp) and comcast my Internet Access Provider (iap.)

**Frankston:** For now, let's get EEv6 shipping. And Bv6, doesn't matter to me, that's between Farooq and his manager and shouldn't interest us users though your readers might care, maybe too much.

**COOK Report:** Just to be 100% clear. You meant Edge V6 or Encrypted Edge V6. Right?

## The Necessary Tools

**Frankston:** When Farooq wrote Ev6, I wanted to make sure we're explicit. I would like it to mean Encrypted and Edge but one can talk about them separately. Encryption of the pipes can be done independently of the applications. The purpose is to bring back the naive simplicity that allowed us to assume our conversations were not being overheard. App-to-app encryption is more appropriate when we want strong security between apps that have their own security model. The pipe security is a compromise as is TCP(which gives the apps circuits at the price of potentially very long delays vs. UDP). In this context, Encryption is then just an edge V6 issue.

Dual port boxes? You get them now. Every XP with V6 is dual port. It's just that the current V6 implementations are a pain to configure and use and get past the NATs and you don't have easily usable encryption. But I should've emphasized that we do have dual V6/V4 in XP. My complaint is that they have 90% of the mechanism there but haven't put the effort in to the take it all the way to "just work". There is a very strong case for saying V6 already is deployed but just not tweaked. And not encouraged. IIS -- Microsoft's Web server and Apache is the primary one on Linux. Get those two working smoothly and you have dual support everywhere (at least potentially).

As to complexity. The V4 prefix approach means the net works as-is. Native V6 routing means that the Ev6 machines use Bv6 addresses rather than those with v4 prefixes but otherwise the edge apps work the same. The Bv6 infrastructure is then able to use native V6 routing rules. Farooq would know more about that than I do. I presume they have more explicit structure that allows the backend routers to do something better. Although there is the risk that better might not really be better as things like MPLS and QoS are unproven conjectures and, I would argue, bad ideas. But I presume that those can be shed and V6 will put more knowledge about the net into the bits. But, again, that's a mixed bag.

**Hussain:** I agree that the MPLS is probably a bad idea in this mix - but it may prove to be a fact of life in many backbones. My feeling is (also based on Bob's observations above) that Ev6 \*may\* drive Bv6 but doesn't have to. Left on their own backbones don't have sufficient rationale or commercial incentive to go to B6.

**Francois Menard:** Bob's dead on.

I'm trying very hard to get [Canadian] municipalities to implement IPv6 open access across municipal FTTH networks so that MPLS doesn't squeeze-in and end-users become required to run PE's. I'm seeing ISP's provide value added services by offering commercial access to tunneling servers on their premises which bridge to the good old legacy Internet. For as long as two service providers across two different municipal FTTH system would want to interconnect with IPv6, there would then be a parallel Internet.

This is in my view a (the) killer app for IPv6 ... I'm not sure why it seems so difficult for people to believe in this ... And if its true in North America, it'll be even more so once open access is properly provided in Japan.

I guess that, rather than debating this philosophically once again, I'd rather throw everything I have into regulatory interventions, like the one which is going out tomorrow in the context of a PartVII

of CAIP to the CRTC. This is going to result in IPv6 being deployed. I'm totally convinced that it's going to end the tight control that incumbents have over last mile DSL and cable modem in Canada and which intentionally destroys innovation through mandating IPv4 and denying IPv6.

## So Where's Market Pull?

**COOK Report:** What is to create a market pull? How do you package and explain and then ignite that?

**David Reed:** Products. Too many products are limited by NATs.

If Ev6 had the property that it automatically ran over NATs, which would not be hard, it would be adopted by lots of new products. Multiplayer video games, CE devices like Tivo and Replay, home security cameras, VoIP phones using SIP... all of which are fundamentally "edge-to-edge" devices (not edge-to-server) and the need to traverse NATs is causing huge customer support and marketing problems.

Yeah, I know about STUN and MIDCOM and UPnP for IGD's, but when all is said and done, Ev6 overlay networking would do the job better, and be more standard, especially since each of those solutions are limited in scope (STUN for home networks, but not corporate ones, MIDCOM for corporate if only the corporate firewall people didn't believe that new applications are evil, and UPnP IGD's are essentially restricted to Wintel clients with a fig leaf of a Linux implementation).

But I'm not holding my breath for Ev6 from anyone focused on communications (operators, vendors to operators, IETF). The communications industry seems not to care about enabling new products at the edge. They seem to want to control and tax any new innovation, strangling it in its crib. None of this "rising tide lifts all" nonsense for them. :-)

I have some hope for the Consumer Electronics industry and the computer

apps (hardware and software) industry just doing something like Ev6 for its own needs, with or without the IETF. Anyone want to form an IEEE committee for edge-to-edge scalable overlay network standards? We could call it "VigorNet" because it would regain the vigor of the original Internet.

**Bob Frankston** Jan 22: I want to clarify the "Xbox" argument.

People claim we don't need EV6 because we can also work around each problem on a case-by-case basis. But that case-by-case basis has brought us a mess. Look at how many of the resulting products require setting proxy information and firewall settings and all sorts of other stuff. Still other applications require external servers to act as relays.

This problem is not only just creeping ossification but also the inability to do new things without a lot of arcane knowledge that locks one into the accidental properties of each of these work-arounds. And as the work-arounds fester the resulting scab is confused as a somehow necessary part of the environment. It is reminiscent of the Heidelberg scars that showed that the student was a great swordsman and, by extension a scholar. Firewalls have become the condoms of computing and NAT's inability to pass interesting traffic makes them into firewalls. Finally we have the "marketplace" assuming that all bits have intrinsic meaning, and asking for these filters to become omniscient.

All of this works very very well. At least by comparison with the ancient world of scribes and quill pens and 1990. We can browse and we can download (a terribly asymmetric word) and we can use those old telephones without having to crank the magneto. How could anything be better? After all, doesn't all this changing stuff threaten all that we have? I would argue that the answer is no.

## Edge V6 as a Sub Routine Library

One way to think about EV6 is as a common subroutine library just like TCP.

TCP gives us those despised circuits but at the application level where they provide some convenience but are still not intrinsic. The advantage of Ev6 is that it leverages the intellectual energy that has gone into the Internet protocols and gives us a minimal commonality that happens to parallel the minimalness of the basic IPv4 Internet.

I compare Edge v6 with MIME which became the common way to extend email rather than having to choose between a lot of different ways to transport binary and multipart messages. We didn't transition email to MIME, we just made it available first to those who understood the need and later to those who just like pretty stuff. The mistake is to try to transition the existing Internet to V6. The real need is for enabling the applications that don't work well though the existing protocols. Depending on how deep their V4 assumptions are, we will find that existing applications can be re-implemented atop V6 with modest effort.

Without V6 we have no synergy for each new application we have to make new arrangements to work around each of the myriad problems. However, with encryption and the assumption that new applications aren't hopelessly naive, we can reposition the firewall as a temporary scab rather than as protection

In building our edge architecture, we should then go on to complete the picture with "dotDNS" so we can avoid making ICANN the ultimate authority on meaning. Building an Edge IPv6 architecture would also subsume much of P2P. The P2P effort is about two things: (1) -applications and (2) work-arounds. Each P2P effort has its own novel solution to tunneling through the barriers and its own unique way of generating persistent handles (names). Mostly these are just idiosyncratic and poor reinventions of the common mechanisms and divert efforts from actually doing anything interesting.

While I'm a great believer in marketplaces, I find that they don't automatically give the optimal path between two

points. If we just look at existing applications, then, by definition, they do not "need" v6. Just like we didn't need the Internet for incrementally better TV or for better faxing.

It's only by accident that we got to experience the web because the Internet had lowered the barrier to creativity enough for Tim Berners-Lee to hack it together in his basement office.

IPv6 is similar. Those of us who have worked with trying to connect things recognize the importance of a consensus that would allow us to have devices that "just connect" instead of constantly having to work around impediments. The marketplace does have this just connect need but some many IPv4 accretions are standing in the way that it can't articulate it.

The simplest solution would be a for a high profile end point player like Microsoft (more than just like) do to do the right thing. Given that the "IP Stack" business is problematic in the presence of players who bundle theirs in ways that make unbundling extremely difficult, an interim alternative would best be done as public spirited project, perhaps by students or others with a need. It can be implemented as an application level library written atop UDP – it doesn't have to be deep in the system. The application would then listen on an EPV6 port for TCP and UDP connections that serve as the IPv6 tunnel from another system.

This outcome would serve as a V6 shim at the application layer. It can let us assume V6 while waiting for "official" implementations.

## What is Holding Back Use and Deployment

The major impediment is a lack of understanding that the Internet is really about simple end-to-end connectivity and the rest is but a detail. But instead of viewing the net as a future opportunity, we find that there is the normal tendency to confuse it accidental properties with what they could be and because those properties work then we assume that ob-

viously we don't need anything else. There should be a clamor to bring back simple connectivity. Yet everyone seems to be in love with firewalls, NATs and gargoyles of all sorts. All this is combined with a menagerie of hobgoblins such as QoS, MPLS and cleverness at working around problems instead of solving them. The Edge V6 need is there. But in order to understand the need, people need to understand the Internet first.

There are existing implementations of IPv6 on XP but they don't "just work". Perhaps writing an application that simply does the configuration would go along way towards usability. Having done that we would still have to address the lack of encryption, the inability to get past recalcitrant NATs, and the inability to leverage the IPv4 DNS entries to name interior systems as the norm. Unfortunately encryption has gotten entangled with authentication. I'm not a crypto expert but we should be able to have a modest level of crypto between two systems that don't know each other.

A secondary problem is that the application support is uneven but I'm not worried about that since it can come later. I want to be able to do simple things like have a VoIP application that just streams between two end points and doesn't use complicated protocols. The fact that such applications are not ready attests to the importance of early Edge v6 availability so we can work out such problems. These are the technical issues. They may have changed greatly in the last year since I looked at the stuff!

## Deployment

We should build EV6 on the specifications for BV6 to the extent we can. Doing so will give us an extended address structure. In deployment the most important step will be to use the IPV4 address as a routing prefix. We may need an additional option for a form of routing that is able to get past older NATs.

This is entirely separate from the question of an IPV6 backbone – that is only a performance issue. It would be nice, however, if the NAT boxes could be re-

purposed as V6 router at the edges of the local network. That would give us the biggest performance improvements.

## Taking Advantage of V6

The major value of V6 is in allowing users to connect devices and not just big iron and web sites. In doing this, the role of the DNS in providing a stable handle becomes very important. Not only do we not need the .com semantics, in this endeavor we must be assured that the names are unique and valid basically forever. This is all the more reason for creating a TLD (I call it .DNS) that simply provides unique identifiers and NS records – the pointers to the actual DNS records which would be maintained by the owner of the identifier.

Note that mobile IP seeks to provide a stable relationships but it does it at the plumbing layer. Such application level stability belongs at the application level and not the network level. Mobile is another example of an experiment masking as a basic protocol and it has contributed to the confusion over IPV6.

**COOK Report:** *Above the Fold* for January 29, commented - "Convinced that large "enterprise" networks of the future will be shaped by the Internet, by ever-increasing needs for security and mobility, and by the convergence of voice and data, Hewlett-Packard's new network strategy is to move more intelligence and control from the core of a network to its edges, using cheap switches populating those edges." We sent the url to Bob Frankston and asked for his evaluation.

**Frankston:** It is an example of screwing things up. Notice level four prioritization -- that's a synonym for breaking the end-to-end connectivity for users by second guessing the applications. And not a word about V6 or extending the addressing model. But lots about security in the network which means more and more speed bumps, twisting passages and meddling police biddies.

Note their press release "Its ProCurve 5300 series switches delivered last summer, for example, which cost about \$65

per 10/100 port, implement a broad range of security features as well as Layer 3 and Layer 4 traffic prioritization features. "They let the customer deploy next-generation intelligence at the network's edge at a commodity price point,"

said Clark.

This sure looks like another one of them bellheads run amuck. It would be wonderful if they provide more information about the network but adding intelli-

gence and discrimination into the heart of the network (the edge is in my PC, not in the IT switch) is just more of the old telco control paradigm.

# Two Internet Futures - With Edge IPv6 and Without Edge IPv6

By Bob Frankston and from <http://www.Frankston.com/public/ESSAYS/EncryptedIPV6.asp>

We can loosely separate two agendas:

The backbone agenda is about improving the efficiency of the Internet infrastructure. For the sake of this essay I will only note these issues to the extent they seem to interfere with the edge agenda.

The edge agenda is about making more addresses available so each host can have a public presence. It is about making more addresses available as well as improved protocols for automatically assigning addresses. For simplicity I'm focusing on the increase in the number of addresses. IPV6 can be deployed at the edges of the network using the existing IPV4 network as a transport.

The two agendas are intertwined to the extent that there must be an agreement on the format of an IPV6 packet and the layout of the IP address. But now that there is agreement on the packet format, we can and must deploy IPV6 from the edges.

## With and Without

To understand the importance of IPV6 we can compare two scenarios.

Without: If we continue business we will simply accept that the Internet used to be exciting but we have to get back to business as usual. Experiments at public access will have mixed results and all-to-often will fail. Hotels will provide some access but it will be limited and expensive. We will find the Internet is increasingly like television with the transport providers carefully selecting which services will work and how well they will work. To most people this won't seem to be a problem and the economic doldrums will seem to be a higher priority. After all, this is the post Internet era and we should reduce our expectations.

With: I'll have to tone this down to be taken seriously. But think about being able to take your computer anywhere and it would just be connected. But why not? Especially if I could just drop an access point anywhere and connect simply and securely. What might not be obvious is that the kind of "Moore's Law" price/performance improvements that have made email free (once one has paid for a pipe to the rest of the Internet) would operate to make these access points act as part of a common good in the same way that we generally allow others to benefit from porch light or a restaurant doesn't charge for tap water. These aren't free either but it would seem counter-productive to try to charge a passerby who uses that light to read a map. The key to driving this cycle is simplicity. This is not the post-Internet era. We haven't even started to explore the possibilities.

One lesson I've learned with VisiCalc is that seemingly minor decisions can make a big difference. In making home networking a normal retail product I took a step towards demystifying the Internet and making connectivity just another commodity. But I was only able to take the first step. I accepted the evil of NATs (Network Address Translation) as I awaited the deployment of encrypted IPV6.

We have waited too long and there is no reason to wait any more since IPV6 can be deployed from the edges without waiting for any changes to the Internet itself!

## Executive Summary :

### The Action IS Taking Place at the Edge, pp. 1-4 [Full Article](#)

At the same time that AOL and the phone companies are trying to staunch the flow of blood (cash) from the center, innovation is taking place at the edges. The US has built a bankrupt national fiber system. Under Michael Powell, the FCC zigs and zags faster than a speeding bullet between innovative spectrum policy and a retrograde insistence that, if just allowed, the walking dead of last centuries telecom, the LECs and Cable Cos will invest in building meaningful infrastructure.

Powell, it seems, isn't much interested in getting the details correct. Rather than taking the trouble to understand the dynamics of the technology in the market place as demonstrated by Clay Shirkey in his ZapMail essay that is republished in this issue, Powell goes on to insist that it was unfair regulation imposed by his democratic predecessors that has bankrupted the industry.

According to an article in the February second *New York Times* <http://www.ny-times.com/2003/02/02/business/your-money/02FCCC.html?ex=1045173242&ei=1&en=c807a35b91f72fd1>, Powell has asserted that deregulation "should not be like a dessert that you serve after people have fed on their vegetables and is a reward for the creation of competition." Rather, he said, deregulation is "a critical ingredient to facilitating competition." Powell is talking the same naive faith in industry self-regulation that put the ICANN fox in charge of the DNS hen house. Powell's statement ignores the central issue that the phone companies would be acting against the interests of their stockholders, when, if given a chance, they did not charge the most extortionate rent for the use of their monopoly possible.

The *Times* writes: "Mr. Powell and his

supporters say a change in the rules will stimulate the economy by encouraging the largest phone companies and their rivals to build more networks and spend more at equipment makers like Lucent, Corning, Cisco and Intel." If this is what Powell truly believes, he is living in a dream world and ought to be removed from his position by the Congress for incompetence. The fact is the phone companies cannot under any circumstances, except those of government enforced monopoly high prices, use the networks they already have. Given their debt they have no money to buy new equipment for new networks. Let's look at the equipment makers that Powell rattles off as companies that would allegedly benefit. Cisco yes, Intel perhaps. But Lucent has gone from 10 billion a year in revenue to two billion because it doesn't make equipment that sane management would buy were it too invest in a new network. With all the fiber in the ground the only new market in fiber for Corning is fiber to the home and if Powell gets his way and gives the telcos a monopoly on that, no sane homeowner would want it.

But Powell, it seems, is interested much more in ideology than in accurately figuring out where the technology is going. Dave Hughes caught Powell giving Senator Brownback of Kansas in correct information about Wi-Fi in his testimony on January 20 as Powell stated that the radios used would transmit at best 300 feet on an 802.11b network.. Hughes skewered Powell in public as well he should have. Within 24 hours Hughes heard back from a Powell assistant. "Thank you for your comments. In the passage you reference below the Chairman simply made a mistake." One wonders how many "mistakes" Michael Powell is making these days?

The Canadians are not making mistakes. They are building a working national fiber system. They are investing 200 million dollars in linking all public schools throughout Quebec with fiber and are

doing it such away that all municipal governments will be on the same fiber. This includes northern Quebec where only the most remote villages will rely instead on broadband radio.

Robert Proulx President of XIT telecom in Quebec told us in a February third conversation that his small company has all the business that it can handle including major fiber community network builds in Hungary and in Jordan.

The Canadian CRTC is taking a very different tack from the American FCC. Telecom in Canada is understood as a major national infrastructure resource in the same way the US understood the interstate highway system 50 years ago. Now our dominant ideology permits investment only in private corporate resources. Already 17th among the global users of telecom services according to a recent OECD study, the United States economy will suffer in coming years because of our current ideological shortsightedness.

The future is in asset-based and customer-owned networks. We have installed cable modem service in order to move our long distance calls to Vonage. Suddenly unlimited long distance in the US is flat rate. All of Canada is 5 cents a minute and most of Europe and much of Asia is not much more. Innovation at the edge is possible and as prices continue to fall the huge companies that Powell want to serve will become more and more unwieldy. Fiber to the home is worth having only if the homeowner can control it.

Meanwhile the edges continue to cannibalize the center - like a million termites chewing on the soggy log of the PSTN. BellSouth was the first ILEC to acknowledge the inevitable and at the end of January announced that it would begin to resell Vonage to its DSL customers. See <http://news.com.com/2100-1033-982606.html> And from a trusted source we are told that in Japan NTT has

effectively ceased development in its circuit-switched landline network.

## Backbone v6 going no where pp. 5 - 11

[Highlights, Full Article](#)

Farooq Hussain explains how reasonable uses for IPv6 in Internet backbones have evaporated. DHCP and Nats acting as firewalls have gotten the need for v6 as a source of extra address space well under control. The idea of universal addressability across the internet for all devices has receded in importance.

He cites very interestingly that in the United States almost all the support for v6 comes from the defense department. In Europe it comes from the European Commission and in Japan from a mandate by the Japanese government.

Mandate or not there no longer seems to be any market pull. End to end applications like voice over IP that once were thought to be dependent on v6 are being re-engineered to work with NATs in the v4 world.

3GPP, which is the third generation mobile project, adopted IPv6 as their protocol of choice in 1999. In doing so it gave v6 the strongest endorsement it has ever had. Yet because at the height of the bubble the 3GPP people decided to build their own internet parallel to the global v4 internet, their plans now seem rather silly. With the slowdown in wireless growth has come a slowdown in wireless demand for IP numbers. If we assume that with the arrival of software defined radios over the next few years radios will communicate with each other on the basis of IP rather than geography this is likely to delay indefinitely the need for v6 in wireless devices.

SONY has announced that all of its devices will speak v6. However in the absence of widespread v6 deployment SONY's products will also have to communicate in a v4 world. The problem is that if they communicate well in v4 there is likely to be no use for their v6 capabilities. It seems that even Jun Murai is no longer promoting v6 wholeheartedly in

Japan. Farooq concludes that we will likely have the worst of all worlds with most of the internet running v4 and few isolated instances of v6.

When we asked Farooq about the January 22 announcement by Telehouse of an IPv6 peering exchange in New York, he responded PAIX has had the ability to support v6 for at least two years. The more interesting announcement was the one for the exclusively v6 exchange set up in France as part of the EC initiative. Also has hardly any takers except those who are compelled by politics to go there by virtue of being participants in the EC initiative. It's fine for Telehouse to make this kind of announcement but the capability is of little commercial interest either to enterprise or service provider networks. There's simply not enough traffic volume with v6 and there are so few native v6 networks that none of them need to go to Telehouse or any other IX to exchange traffic. The IX's used for v6 have been established primarily to foster R&E projects and are sustained primarily on non-commercial rationales.

## Edge based v6, pp. 11 - 17 [Highlights, Full Article](#)

v6 in the backbone. Farooq agrees. It seems that v6 at the edge can be used by end users to establish their own applications and perhaps even routing by using v4 addresses in the v6 packet headers.

Frankston has written: IPv4 (or just "IP") represented the birth of the Internet by shifting the power to define the network to the users at the edges.

The Internet has thrived because supply is driven by demand. New application services are supported by simply providing more transport (or IP) capacity. Rather than wait for new capabilities to be defined, users will create their own solutions. (When I say "users" I don't mean all users create applications. It only takes one motivated, creative individual with some time on their hands to create an application that will be adopted by millions of others. We just don't know which user that will be.)

Francois Menard commented: I'm trying very hard to get [Canadian] municipalities to implement IPv6 open access across municipal FTTH networks so that MPLS doesn't squeeze-in and end-users become required to run PE's. I'm seeing ISP's provide value added services by offering commercial access to tunneling servers on their premises which bridge to the good old legacy Internet. For as long as two service providers across two different municipal FTTH system would want to interconnect with IPv6, there would then be a parallel Internet.

A current problem is the absence of a good v6 tool set for end users. Right now it is not clear where one will come from. Standards development would prove useful. But by whom? The IETF is very unlikely. The IEEE perhaps. The Consumer Electronics Association claims to be doing work in the area. Unfortunately, we have not had enough contact to evaluate them.

## ZapMail pp.18 -20

[Highlights, Full Article](#)

When does a service become just another product that the phone company's customers can deliver best and at lowest cost for themselves?

Clay Shirkey has written a powerful essay that likens the Local Exchange Carriers' world view to that of Fed-Ex when it though it needed to build a fax network to gain an advantage that other overnight carriers didn't have to offer their customers only to find that the customer could deliver information by fax much more cost effectively themselves.

The business Fred Smith imagined being in -- build a network that's cheap to run but charge customers as if it were expensive -- is the business the telephone companies are in today. They are selling us a kind of ZapPhone service, where they've digitized their entire network up to the last mile, but are still charging the high and confusing rates established when the network was analog.

## Discussion of ZapMail, pp. 21-24 [Highlights](#), [Full Article](#)

Adrew Odlyzko agrees that VoIP will lead to the flat rate commoditization of long distance phone service. but he them wonders about wireless being able to create a substantial enough infrastructure for voice communication.

A product known as Locustworld may have the answer. "A UK company has produced Mesh wireless technology which you can buy and install, today, for under £300. Fancy setting up as a rival to BT Openworld? Even in a remote village? Easy: buy a Locustworld Mesh-Box; half the price of a home PC. You're in business."

"The software is the key to Locustworld. Written by text-message pioneer Jon Anderson, it configures a group of wireless access points into a coherent "mesh" and connects them to any broadband Internet node available."

"Most experts regard the mesh approach as hugely complex, because of the effort needed to set up the mesh. The system used to be known as a "parasitic network" - although the fashionable term these days is "symbiotic" - the idea is that you turn a group of wireless nodes loose, and tell them to introduce themselves to each other. Then you set up routes through the mesh. It can be fiendishly complex, but Locustworld's mesh does this for you. You just buy the node from them: the current model is £250 plus VAT."

"The last legal obstacle, according to founder Richard Lander, was the decision by Oftel, allowing people to share their broadband with up to 20 others.

## Farber Faulhaber versus Open Spectrum pp. 25 - 30 [Highlights](#), [Full Article](#)

A discussion of the problems created by the presentation of a paper that looks to the past encourages spectrum auctions

and their maintenance of property rights in spectrum while saying oh by the way you open spectrum folk may be given so called "easements" since your magical radio technologies will not get in the way of our much more rational corporate approach.

## How NSF Was Prevented from Removing the govern- ment from domain names? pp. 31 -34

[Highlights](#), [Full Article](#)

Don Mitchell explains that a major policy change by the National Science foundation was aborted. The change would have ended government involvement in the DNS. It could have nipped ICANN in the bud. But this was not to be..

Had the cooperative agreement concluded in spring of 1997, as the NSF intended, the problem of institutionalizing the IANA function would have been forced out on an open table (or, possibly made moot) by the demand for (and creation of) additional TLDs. It might also have been forced into the courts. It certainly would have become more clear to many more people that one of the most critical underpinnings of the Internet, the IANA function, had no basis in law. Neither domestic nor international. If the play had been open, the high stakes mania that festered into the Internet bubble might well have not reached such a fever pitch. The industry might not have ridden so high and fallen so hard.

The over ruling of NSF plans for termination by Burr and her ISOC clique and the resulting extension of that agreement allowed a small number of high stakes players to keep the game closed. The game was still closed in June of 1999 when in the ICANN board emails we published Esther Dyson, IBM, Vint Cerf and Mike Roberts hatched a strategy to get money for ICANN from the venture capitalists of Sand Hill Road by warning them that their investment were in danger if ICANN did not succeed and by meeting with Tom Kalil in the White House to seek support. Today the in-

vestments of the Sand Hill VCs have largely vanished, the IANA function is still not institutionalized. Indeed today February 3, 2003 the IANAfunction was just handed back to the same closed group of high stakes players who profess to operate ICANN with openness with authority. In reality the game is still closed.

## Lessig on Governance pp. 35-40 [Highlights](#), [Full Article](#)

Larry Lessig in the document that follows gives the best overview that we have seen of the details under girding ICANN's construction in the year 1998. In the talk that we republish with his permission, he shows how the GIP ISOC Clique found in Joe Sims an attorney who enabled them to take advantage of libertarian distrust of government to create an ICANN that they could use for their own narrow ends and brought on four years feuding and distrust. ICANN from the very beginning was broken. Such was the distrust of government that no one would own up to seeing the brokenness. Lessig saw it however and his analysis of what could be expected from ICANN from the position of hindsight more than four years later reads like prophecy.

## News Item Dave Hughes to Chairman Powell - Jan 22, 2003

FCC Chairman Powell in testimony to the US Senate. "That's the way that current technology is configured and deployed. Right now the leading standard of 802.11 a b and g in their very first have a limit in their range. At best 300 feet on an 802.11b network.. " THAT IS AN ABSOLUTELY FALSE STATEMENT!!!! 'at best 300 feet' WHY DID HE MAKE IT?

1. There are over 10,000,000 Wi-Fi systems out there. 1.5 million more each month.
2. There are over 2,500 and probably over 4,000 Wireless ISPs using Wi-Fi radios doing business across the United States as I speak. Largely RURAL. I will wager not ONE of them is serving customers 300 feet or less. Most are from 1

mile to 10 MILES using off the shelf equipment certified by the FCC and within the power limits - 36dBm EIRP - prescribed as the maximum for 802.11b radios. 3. Cisco sells tens of thousands of 802.11b 'Aironet' radios which are ADVERTISED as reaching 18 miles at 11mbps or 25 miles at 2mbps! <http://cisco.com/univercd/cc/td/doc/pcat/350wibr.htm#fea> 4. Young Designs Inc sells COMPLETE 'Wi-Pop In A Box' system for communities advertised at 12 miles! Standard, certified, systems. 5. Well funded companies are ramping up to deploy Wi-Fi across cities all over the US. One announced today it was targeting 80% of the Front Range Colorado population. And yes, they will backhaul over broadband wired networks, to answer your question accurately, Senator Brownback. 6. I have spent the last 3 YEARS buying, deploying, testing Wi-Fi 2.4ghz as well as other Wi-Fi Bands (915mhz, 5.7Ghz) radios for 4 more years from half a mile to 15 and more miles. And I AM a Wireless ISP ALL of whose customers are Wi-Fi 2.4ghz at ranges from a third of a mile to 2 miles!

I KNOW what I am talking about. Why doesn't the Chairman of the FCC? Or his Staff, who prepared him for this Hearing? Or is there a hidden agenda there? That kind of completely false and misleading statement before Congress angers me! For in effect he was telling Senator Brownback, whose 'colleagues' and constituents CORRECTLY identify Wi-Fi as ONE technology which can bridge the 'last broadband mile' until whole new generations of radios are invented, that Wi-Fi is of NO REAL VALUE for Broadband. I KNOW what I am talking about. Why doesn't the Chairman of the FCC? Or his Staff, who prepared him for this Hearing? Or is there a hidden agenda there?

That kind of completely false and misleading statement before Congress angers me! For in effect he was telling Senator Brownback, whose 'colleagues' and constituents CORRECTLY identify Wi-Fi as ONE technology which can bridge the 'last broadband mile' until whole new generations of radios are invented, that Wi-Fi is of NO REAL VALUE for Broadband.

**The COOK Report on Internet  
COOK Network Consultants  
431 Greenway Ave  
Ewing. NJ 08618, USA**

**The Customer Becomes the Network - \$395 Now available.**  
<http://cookreport.com/asstbased.shtml>

### Subscription Rates

Choice of either ascii or Adobe Acrobat (PDF) format 1. Individual; College or University Department; or Library; or Small Corporation - \$300 2. Corporate - (revenues \$10 to 200 million a year) - \$395 3. Large Corporate- Revenues of \$200 million to \$2 billion per year - \$495 4. Very Large Corporate- Revenues of more than \$2 billion per year - \$595

Site License: The right to distribute ascii and PDF via email to all employees of corporation. 5. Small corporate: \$495 6. Corporate: \$775 7. Large Corporate: \$1000 8. Very Large Corporate: \$1250 . Site License Distribution via intranet web site \$400 a year additional. See [www.cookreport.com](http://www.cookreport.com) for more detail

Gordon Cook, President  
COOK Network Consultants  
431 Greenway Ave  
Ewing, NJ 08618, USA  
Telephone & fax (609) 882-2572  
Internet: [cook@cookreport.com](mailto:cook@cookreport.com)

[How to use interactive features of this PDF. Click here with hand tool.](#)