The COOK Report on Internet → NREN

A Mission Statement- Vol. I, Number 1 April 1, 1992

In Search of Leadership & Vision in the Building of a National Network

Can anyone remember when this nation in the sixties had the vision to adopt the goal of putting a man on the moon and the leadership to carry it out? Can anyone blame Senator Gore for trying to make a vision of a national computer network? Can everyone imagine the new startups and new technology that could be gleaned from an NREN that actually had a well articulated vision and a plan for how to get from here to there that all the players could agree on?

There is no plan and beyond some hazy images there is no vision. This is tragic. *The COOK Report on the Internet NREN* is dedicated to the premise that our goal must be that of a global, interconnected network where use can be afforded by everyone who owns a computer and a modem as well as those who can use publically available terminals. Our goal also should be to create an environment in the USA where state of the art technology can be created, tested preliminarily on a nationally supported education and research network and *then* moved onto commercialized production networks.

Our current mess has developed in the absence of vision and leadership. What we see is that the National Science Foundation, in trying to stretch scarce budget dollars, has tried to pretend that a single network can be *both* a development and production test network a la the old NSFnet, *and* a commercial network defined by the commercial interests of a single computer company and telecommunications carrier.

The federal money that has been allocated - given the current don't-rock-the-boat-and-endanger-the-next-NSF-grant syndrome that has developed - may actually be helping to lock the major players into their current non productive stance. The "emperor" has no clothes and his subjects are beginning to notice.

Taking Congress at its word, the *COOK Report* will be a forum for the establishment of a network that is universally accessible by all Americans in pursuit of research or education. Beholden to no one save its subscribers, it hopes to serve as a seed bed for creative ideas and provide nurture to anyone willing to try to lead the network to serve *both* national goals of technology development and improved research and education. Do this well and network growth and commercialization will take care of themselves.

Congressional Hearings on Management of NSFnet Spotlight Disarray of Network Commercialization and New Technology Development

Science Subcommittee
2325 Rayburn Bldg.
Washington, DC - March 12, 1992

Today Congress began the process of coming to grips with the NREN component of the High Performance Computing and Communications legislation. In three hours of oversight hearings into NSF management of the NSFnet the following concerns emerged:

Award of the exclusive privilege to control commercial use of the NSF/ANS backbone to ANS has unfairly tilted the playing field in favor of ANS. The subcommittee reacted negatively to the tilt and began to question the commercial use restriction itself.

Federal funding for the backbone was questioned and portrayed by Congressmen Boucher and Packard as possibly of limited future use. Mitch Kapor, in his capacity of Board Chairman of the CIX, and PSI's Bill Schrader asserted that the technology of the NSFnet was fully commercialized and of production quali-

On the Inside

ty. Hence government funding was no longer appropriate. MERIT and Educom claimed that such a stance would freeze the network into its current state of technology evolution. The technology of NREN, they said, was definitely precompetitive and deserving of Federal support. The disagreement highlighted the NREN's lack of focus, definition and planning.

A consensus emerged between Kapor, Schrader and the Committee that if funding for the backbone ended, Federal funding to ensure access was appropriate. Much discussion of new subsidy models occurred. Institutions should be able to choose services from an eligible backbone provider and the use of Federal funds to assist less wealthy institutions in acquiring network access would be appropriate. Assistance for mid-level networks in finding alternative backbone connections was also considered to be possibility but one that would take, in the words of Dr Eric Hood, President of FARnet, 18 to 24 months to implement.

The rebid of the backbone came under scrutiny. The length of additional time granted to MERIT was questioned. The NSF was put on notice that it should take care that its actions would increase competition. Suggestions were made that providers of future backbones should be barred from selling commercial attachments to the network.

Overall, the hearings showed a fundamental impass between the forces favoring commercialization of the NSFnet/NREN and those maintaining that the future of the network must be, not in the delivery of services on a commercial basis, but rather in new technology development. While each side framed the issue according to its own objectives, Mitch Kapor did provide an insight into an alternative scenario of a second development network that, if followed, could lead the way out of the impasse. (See Editorial, p.7 and "Packard Calls", p.6.)

The hearings were chaired by Rich Boucher (D. VA) of the Science Subcommittee of the House Committee on Science, Space and Technology. Ron Packard (R CA) appeared for the minority. The hearings lasted nearly three hours - over two hours of which were devoted to questioning of the witnesses by Boucher and Packard. The discussion was quite lucid. To give readers as accurate as possible a picture, we present the panelists largely in their own words.

Roberts, van Houweling, Hood, Kapor, & Schrader: Opening Statements

Mike Roberts, Vice President for Networking of Educom, lead the opening statements by asserting that the basic issue was how to guide "this unprecedented effort" - adding that there were few models to follow. The effort was plainly successful when measured by numbers of new faculty and students using the network and by an sustained growth rate of 11% per month in traffic crossing the backbone since July of 1988.

Doug van Houweling, Board of Directors MERIT Network Inc, emphasized that he appeared on behalf of MERIT, a non profit corporation of nine Michigan Universities. He asserted that they had upgraded the backbone speed from 1.544 megabits per second to 45 megabits per second. That every Federal dollar invested in the backbone had been matched by more than $4 in MERIT partnership money. That MERIT had begun the process of privatizing the network - something called for by the Congress. That a portion of ANS CO+RE profits flows back to the 650 colleges and universities attached by the mid-levels. And that the network provides access to more than 1000 high schools.

Eric Hood, President of the Federation of American Research Networks, stated that NSFnet is a bonafide success providing access to 70% of the students of the nation's four year colleges and universities. He added that he believed that the NSF had leveraged technically sound investments in the network and that every dollar of Federal funding had leveraged $31 in state and local funding.

Mitch Kapor, representing the Commercial Internet Exchange and the Electronic Frontier Foundation, as

Opening Statements (con't)

serted that he fully supported the concept of the NREN but cautioned against allowing the development of information have and have nots. Kapor cut quickly to the heart of the issue with three points:

1. The NSF acceptable use policy (AUP) is hindering the development of information services growth. The AUP ought to be modified or dropped in order to permit the growth of information services.

2. ANS enjoys exclusive rights to carry commercial traffic to the 32 mid-levels. This tilts the playing field unacceptably. The National Science Board should be directed to reconsider its 18th month extension and the MERIT contract be brought to a rapid close.

3. The funding model should be changed to an institutional focus. A single, centralized, federally-funded backbone is no longer necessary. The network should move towards direct interconnection among the mid-levels.

Bill Schrader, President Performance Systems International, attacked the entire MERIT NSF relationship stating that the technologies applied to the backbone by IBM were of questionable quality, that privatization of the backbone was done in secret and disclosed by accident a year later; that he NSF had provided its contractor with a monopoly, and that the NSF had paid in full for the T-3 backbone when in fact there had been 15 months of non performance. ANS has been prepositioned by the NSF as the NREN contractor. The cooperative agreement with MERIT should be terminated in November and the backbone provided by commercial suppliers.

Editor's Comments: Of course while one can measure the number of colleges and universities joining the network for the first time - no one has any reliable figure on the percentages of faculty and students at these institutions who actual use the network. Also up to the beginning of the trouble filled installation of the T-3 backbone in January 1991 the growth rate had been 20% per month.

In fact while MERIT claims to have an operational T-3 backbone in place and while the National Science Foundation has been paying 10 million a year for its service since October 1, 1990 as of March 12 1992 only 6 of the 16 nodes of the old T-1 had been connected to the new T-3 and for technical reasons traffic was limited to twelve megabits per second. PSI asked later why the NSF had no

non compliance penalty in its cooperative agreement with MERIT.

The National Science Foundation has refused to put a dollar value on the contributions of IBM and MCI. When the subcontractors place dollar values on their own "contributions" the tendency is to over value them. PSI stated in its written testimony that the worth of switches valued at $100,000 by IBM was actually $25,000. Privatization was indeed called for in the legislation but not before 1996. While the "purpose" of the ANS infrastructure pool is to use CO+RE profits to build network infrastructure, the current value of the pool is estimated by ANS itself at only $25,000. Finally, the figure of 1,000 high schools on the network makes sense only if one thinks in terms of email connection through state networks and not of direct access.

Subsidies Wanted - But for Very Different Purposes

Congressman Boucher began by asking whether subsidies were still needed for the NSFnet backbone in view of the fact that commercial providers were beginning to offer the service that the NSF was giving at no cost through its backbone.

Mitch Kapor replied that indeed the government provision for free of what the commercial backbone carrier were trying to offer was impeding the further development of the market and should be stopped.

> We believe that a federal subsidy for the network is no longer needed. . . . [we may need] funding directly to a particular class of users who might not otherwise be able to afford the connection - Kapor

"So. . . as regards the production network that is used for the day-to-day business of the majority of users, we believe that a federal subsidy for the network is no longer needed. What may be needed, in order to ensure equitable access to users, is funding directly to a particular class of users who might not otherwise be able to afford the connection"

Answering a question from Congressman Boucher, Kapor clarified what he meant by classes of users.

Kapor: "Yes sir. Colleges, universities, junior colleges, k through 12." (Boucher then invited Mike Roberts to respond.)

Roberts: "I think that the issue here has to be framed in terms of the transition from a precompetitive environment to a competitive services environment."

"There is a tendency to think about this in static terms: that since we can buy commercial T-1 cheaply that we have been a success. In fact we haven't been a success at all. The challenge is to move this technology forward into the broadband era. Other countries are preparing very actively to do so. It is absolutely essential that the United States make such an investment to face this competition, and to take a leadership role in it. In fact it is embodied in the act that the goal for the NREN is the functioning of an end-to-end gigabit network...."

> We don't regard a production NSFnet as an appropriate role for the NSF or for the NREN. - Roberts

"We don't regard a production NSFnet as an appropriate role for the NSF or for the NREN. In fact given that the CIX exists, that it is making money, we view that as a layer of use of the Internet in the United States that demonstrates the successful transfer of technology . . . . It is absolutely essential that we not forget that somebody has to push the leading edge forward. Our universities believe that the NREN is the vehicle by which we should do that."

Boucher: "We all agree that government expenditure is necessary to develop the technology for the NREN. There is no debate about that. My question is how do we distinguish that which is being done to advance the NREN from the current subsidy that is being provided for the NSFnet itself? The suggestion that Mr. Kapor

Subsidies (con't)

made is that rather than providing that subsidy to the service providers . . . that we send it to the user community to ensure that those, who otherwise might be underserved or not have adequate access to the network, would have it. What is your response to that?"

> Once that you have decided that a student or a group of students is entitled to access, where do you stop? . . . .It is not in the national interest to start another entitlement program. - Roberts

Roberts: "We simply don't have a situation in the United states in education where there is any feasible way to do that. It could only be addressed on the basis of some massive entitlement program. Once you have decided that a student or a group of students is entitled to access, where do you stop? There are 50 million students in primary and secondary schools. There are 14 million students in colleges. There are 4 million graduate engineers and scientists in the united states. It is not in the national interest to start another entitlement program."

Some Comments from the Editor

In Washington today, if one calls a technology "precompetitive" it means that it is acceptable to the Bush administration to use public funds in support of such a technology. Roberts, in looking for funding for new high end network technology, comes down on the side of designating the NSFnet/NREN as precompetitive despite the predominantly commercial character the NSFnet has acquired in the past few years.

In talking about an "end-to-end gigabit network" Roberts is vague about what the "end" of the network is. Very very few involved in the development of gigabit technologies expect that clear channel gigabits will reach more than a tiny fraction of one percent of actual users within the next decade.

In stating that Educom does not regard a production NSFnet as an appropriate role for the NSF, Roberts here betrays the essential confusion afflicting the backers of the NREN. No one involved has been able to design a plan that lays out where the technology transfer will take place: in the gigabit testbeds, or in the NSFnet production network? New technology is

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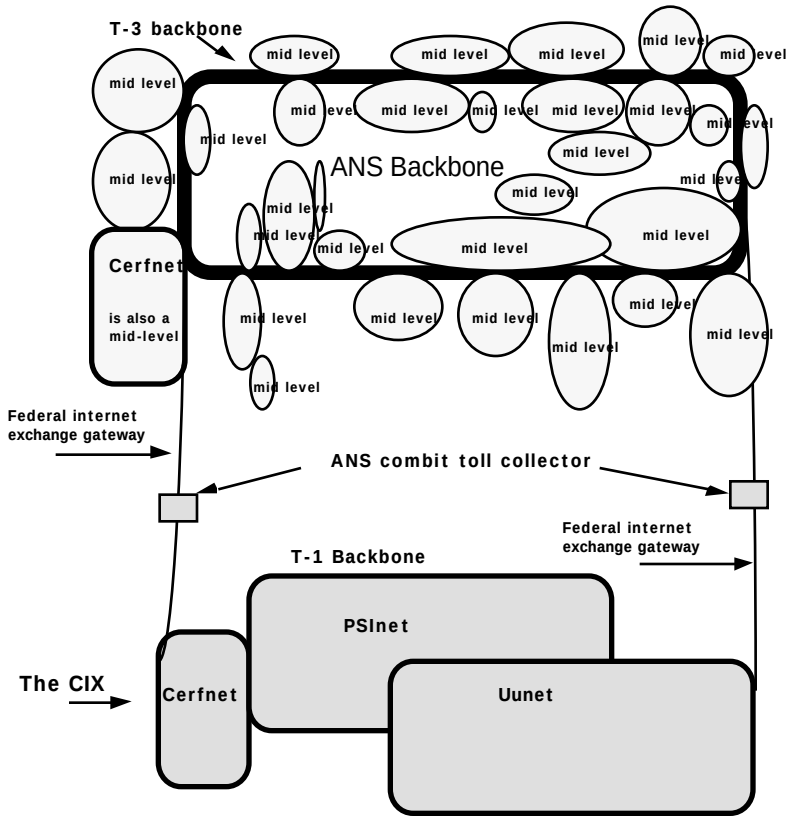
A Tilted Playing Field

Boucher to Mitch Kapor: "You have indicated that the commercial service providers other than ANS and its profit making subsidiary ANS CO+RE, have a disadvantage. What is the nature of that disadvantage?

Kapor: "It is both substantive and perceptual. . . . There is, by virtue of a series of agreements between the NSF and Merit and ANS and other parties, which are extraordinarily complex and opaque, in our opinion a grant of an exclusive right to ANS that ANS's competitors do not enjoy - the grant of an exclusive right to carry commercial traffic on the same physical facility which no one else has the right to do . . . as well as to carry traffic across NSF sponsored gateways or connections to the mid-level or regional networks, and nobody else can do that either.

There is, by virtue of a series of agreements between the NSF and Merit and ANS and other parties . . . a grant of an exclusive right to ANS that ANS's competitors do not enjoy - the grant of an exclusive right to carry commercial traffic on the same physical facility which no one else has the right to do. - Kapor

Ans "owns" the principal means of interconnection for 32 mid-level nets connecting 1200 institutions. It also has monopoly over commercial access.



The Commercial Internet Exchange has 3000 commercial entities that wish to connect to the 1200 R&E customers of the 32 midlevels. ANS says its infrastructure is more costly to support and therefore it should collect tolls from the CIX. The CIX says that data should flow between all network providers without settlement tolls.

Figure 1: The Playing Field

Since those mid-level networks are all already connected to each other through the NSFnet [backbone] by ANS, ANS enjoys some inherent advantages in attracting new commercial customers to join the network because they can offer greater connectivity. If you become a commercial customer of ANS, the argument is made that you have greater reachability, and a larger market by virtue of the particular relationship that ANS has to be able to carry commercial traffic to all of the mid-levels. And none of their competitors can make that claim."

A note from the Editor: Figure 1 shows the CIX and ANSnet networks. The CIX is the smaller race track at the bottom. It is linked to the large ANS/NSF racetrack at the top by the Federal Internet Exchange (shown at each side to represent its east and west coast linkage). The big race track is also linked to 32 other small race tracks (the mid-levels). All kinds of traffic can go from the little race track to one of the 32 small race tracks only by way of the big race track. Meanwhile astride that race track sits a proprietor to whom, in return for considerations rendered, the government has granted the right to set and collect tolls for commercial traffic. (It must allow traffic defined as research and education to pass without challenge. See AUP article p.8.) Commercial access to the big race track (NSFnet) buys access to the little track (CIX) and to the 32 small tracks (mid-levels). Access to the little track (CIX) brings access to the 32 small tracks (mid-levels) only if you pay the tolls set by the proprietor of the big track (ANS) who is also a competitor of those managing both the little race track (CIX) and the 32 small race tracks (mid-levels). One would not be remiss to say that the proprietor of the big track - ANS - was strategically positioned.

Kapor continues: "I want to make clear that I understand that right was granted in return for an investment by ANS, and by IBM and MCI to actually build this network and leverage the federal money as a number of you have been saying. I don't dispute that, but I really don't believe that due consideration has been given to the effect on competition of letting one carrier have a right to conduct commercial for profit business over a facility that is funded in part with Federal dollars . . . . This just doesn't make any sense since T-1 and T-3 networking can now be done with off-the-shelf equipment much more easily than the current travails of the NSFnet suggests. I believe there is no economically justifiable reason for this."

Boucher: "Isn't it true that any other commercial provider can connect to the NSFnet backbone?"

Kapor: "They can connect, but they do not have the right to send commercial traffic as opposed to research and education traffic over that network."

Boucher: "But they do for a fee? There is a charge by the NSFnet for the movement of non-conforming traffic. Conforming traffic is defined as that which is non proprietary and for research and education purposes."

This manifest change in the nature of the NSFnet to permit the coexistence of commercial traffic was launched as a total fait accompli with zero opportunity for any of the other players to register their comments on it . . . - Kapor

Kapor: "Let me try to refine that. The first thing is that this arrangement was imposed not by the NSF, but by ANS, and it is clear that ANS itself would have to obey its own rule. But you don't have fair competition if a competitor gets to set the rules by which all other competitors have to play. All these arrangements were carried out, not by way of a public process, but through an extension of the original cooperative agreement. This manifest change in the nature of the NSFnet to permit the coexistence of commercial traffic was launched as a total fait accompli with zero opportunity for any of the other players to register their comments on it . . ."

In response to a follow up question from Boucher:

Kapor: ". . . . if the government comes and pays you 10 million dollars to build a network and then gives you an exclusive right to do something with it, . . .then you have a guaranteed base of business which competitors do not have . . If this had been done without giving ANS the grant of the right to carry its own commercial traffic, it would have been a different matter because this is the element which creates the distortion."

Boucher: "Alright, now that we have identified a possible source of anti competitive action, let me ask you this. Do we solve this through the recompetition that the NSF is proposing for later this year, or do we have to go another solution and, that is, simply to say the manager of a network may not have the opportunity to put its own commercial traffic on the network?"

Kapor: "I have to say that I think the proper discussions among all concerned parties have not taken place . . . . I think we have to be flexible about how rapidly we could move to a zero backbone solution and rather than be looking at an 18 month extension, we would like to have the emphasis placed on saying how are we going to move into the next phase . . . ."

Boucher (to Eric Hood President of FARnet): " Do you think that any discrimination exists between service providers today?"

Hood: "From a mid-level perspective we have the equal opportunity to buy service from more than one commercial provider."

Boucher: "Do you discount the argument that because ANS operates the NSF network which has government support that it is in a competitive position superior to other service providers because the unit cost for every item that it transports on that network whether that be its own commercial traffic or the public traffic is lower,

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Packard Calls for a Cutoff in Aid for the Backbone - The Decision Is "When" Not "If."

An exchange between California Congressman Ron Packard, Mitch Kapor and Doug van Houweling betrayed the dichotomy of viewpoints between those wanting to press ahead with an operational production network and those want to treat the NSFnet as a precompetitive government testbed. Packard asked what would have to be done with the recompetition of the backbone to create a level playing field?

Kapor: I could suggest a couple of options. One option would be to say that the network manager could not also play a commercial role. . . . . Another possibility is to move to the other end of the spectrum and do it in such a way that all commercial carriers would have equivalent access to whatever backbone were put in place. I won't tell you that I know how to do that today, but I will tell you that it is worthwhile to discuss.

What stands in the way of that today is really the acceptable use policy and that is why modifying it, or dropping it, in order to give all commercial providers equal access to these federally supported and subsidized regional networks would be another way of leveling the playing field. The distortion comes when you take one, or for that matter, two carriers and partially subsidize them and give them commercial rights that nobody else has . . . .

. . . separate out the idea of a production backbone, that is the services which occupy 99% of the users on a day to day basis. Separate this network from investment in precompetitive ultra high speed broadband networks. My reading of NREN is that it needs to serve both purposes. - Kapor

Let me mention, if I may, a third option which is to separate out the idea of a production backbone, that is the services which occupy 99% of the users on a day-to-day basis. Separate this network from investment in precompetitive ultra-high-speed broadband networks. My reading of NREN is that it needs to serve both purposes. To expand the reach and to develop a high end. . . . To expand the reach, let there be subsidy to the institutions to purchase services on the open market. . . . . At the same time, to develop the high end . . . . We support this but we don't want to see it confused with the day-to-day production network that serves millions of users today -- millions of whom are already in the commercial sphere. Sixty percent the institutions on the US Internet are commercial entities. The rate of growth of commercial institutions far outstrips the rate of growth of educational institutions.

Parkard: But Dr van Houweling you had mentioned that only about two percent of your institutions were commercial. How does that fit with what we have just heard? And how much money does that represent in terms of

your budget?

Van Houweling: The answer is a very small proportion. May I make a couple of observations at this point? First of all we have have to be clear on whether the purpose of the High Performance Computing and Communications program is to move this nation forward in the application and availability of the very highest capability networking that we can provide for a lot of purposes, or whether it is to provide a level playing field for a competitive industry?

My understanding of the legislation is that we are supposed to try to move forward with the frontier. In order to do that, we in my view need to work with and trust the National Science Foundation. . . to fashion a program that moves our technology forward and provides higher access to that technology as it moves forward. Before the present effort, the technology that you could get to do this work typically operated at very much lower speeds, and there was not a strong industry in the United States that was playing a national leadership role in this technology. It is still the case that we cannot buy off the shelf T-3 routers that will actually operate a network of the complexity of the NSF backbone network today. We are still having to develop technology to meet todays demands. If we are satisfied with the goal of creating a level playing field, then what we will get is a set of responses from industry which allow industry to make a profit. They will be safe responses that won't move us forward in technology.

I am not sure that this member of the committee agrees with your deduction. The role of government . . . is essentially to move a fledgling growing industry industry into a technology level where the private sector can often do what government no longer does effectively or efficiently. The dilemma that we must face and the decision that we must make ultimately is: when is the cutoff date, not if there shall be one. - Packard

Packard: I am not sure that this member of the committee agrees with your deduction. The role of government . . . is essentially to move a fledgling growing industry industry into a technology level where the private sector can often do what government no longer does effectively or efficiently. The dilemma that we must face and the decision that we must make ultimately is: when is the cutoff date, not if there shall be one. When do you wean an industry to the point where American ingenuity and private sector abilities are able to go out and compete in the world marketplace better than government because there comes a point, in my judgement, when the private sector can do just what you said we ought to do with this better than government can do it?

Editor's comment: Doug van Houweling's remark that "we cannot buy off the shelf T-3 routers that will actually operate a network of the complexity of the NSF backbone network today" highlights another complexity of the ongoing debate. While trying to put the T-3 backbone in place, ANS has been involved in the design of T-3 routers with IBM. They haven't performed well. Some claim that other T-3 routers now released can do the job and should be used. MERIT, ANS and the NSF deny this. While a recent discussion on the com-priv list focused on some of the technical problems, it did not provide clear answers.

"Packets"

We received the following statement of concern about the N. Carolina T-3 state network CONCERT - certainly one of the highest tech in the country.

CONCERT is funded by the state as an economic development activity run by the Microelectronics Center of North Carolina (MCNC). CONCERT increasingly justifies its budget on the benefits to the universities. Unfortunately, decisions of network operation are made by MCNC and the universities served by the network have little or no involvement in decision-making. Like the NSFnet backbone is to the mid-levels, the CONCERT backbone within the state is free to the universities connected. The state also has an X.25 network that is operated by a unit of the university system that is increasingly under pressure because it is not adequately funded and must compete for scarce dollars! Unlike CONCERT the costs of this network are almost toatlly recovered from the institutions it serves. As at the national level the playing field is not level and MCNC, the subsidized player is not directly accountable to the needs of its customers.

A week later, Alison Brown, Director of OARnet, pointed out that the hieracrhy apparent at the national level with the backbone extends downward into the regionals:

"The contrast at the hearings about whether the Internet is a production (commercial) or a pre-commercial technology was fascinating. There were clearly two opposing views held bythe commercial providers and by the educational community."

"Possibly an explanation is better found by looking not at the technology itself, but at the self-interest of the participants. If the Internet is a production technology, then common wisdom holds that it is inappropriate that direct federal subsidies be used for development and deployment. In that case, universities would be expected to pay the full cost of their Internet connection out of their own funds. NSF grants for operational expenses to regional networks and the NSFnet would become suspect - no one expects NSF to grant MCI and Sprint funds to provide telephone service. Obviously those who receive grants from the NSF to provide Internet services to the educational community would like to see those grants continue."

"On the other hand, if the educational community were buying their Internet services on the open market, many universities might either buy from PSI or AlterNet (or from one of the regional networks which would then buy from PSI or AlterNet), so obviously both those companies do want the Internet to be a production technology."

"It has been suggested that rather than subsidizing the NSFnet backbone, NSF might award funds to the regional network

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An Editorial

Is the NSFnet Commercial or Precompetitive Technology? A Win-win Solution

The Hearings showed the sharp contrast in the NREN policy debate. Mitch Kapor and Bill Schrader were adamant that the network represented a commercial technology no longer in need of government funding to develop further. Mike Roberts, who testified for Educom, and Doug van Houweling, who appeared on behalf of MERIT, were just as adamant in their belief that the network should be viewed as precompetitive technology and a platform for development of the high bandwidth new tools of multi media electronic mail and databases that have been spotlighted as among the goals of the NREN vision. In such a set of circumstances government funding for the backbone would be expected as a matter of technology development and the goal of economic competitiveness.

In the opposing view of Schrader and Kapor, the maturity of current network technology is such that it should be brought, by commercial providers, to large numbers of users as an enabling technology or a tool to be used for improved research and education. The result is a win-lose debate. On the one hand we have a new technology for a small elite now and new markets later. While, on the other hand, we also possess a commercially mature technology used by several million Americans for improving their daily tasks of research and education. Both uses are valid ones - yet the fact that they were presented as being in such stark conflict at the hearings reveals the abysmal state of planning for the implementation of an NREN.

Like it or not, the NSFnet has been commercialized and T-1, if not T-3 IP internetworking, is not a precompetitive product. However those who want the federal money to develop a fancier higher tech "bleeding edge" NREN, say that, if they allow the NSFnet backbone to be treated as a commercial production entity, they will be left without a platform to move the technology forward. The central question seems to be that there is only one backbone that reaches all 32 midlevel networks and that this backbone is desired by different parties to be *both* experimental *and* of production commercial quality. An impossible sounding task.

The debate between Roberts and van Houweling, on the one hand, and Schrader and Kapor on the other helped to clarify what the NSF must do in its solicitation. Choosing two different providers for the same kind of backbone it now has makes no sense. Rather it must choose to support two very different backbones.

Schrader and Kapor are correct to assert that, as long as the backbone is a free good for the mid-levels and their 1200 connected institutions, the Federal use of taxpayer dollars is holding back the further development of a commercial industry where companies like Uunet and PSI can offer production quality commercial networks. To have one partnership prepositioned for exclusive commercial use of the production backbone because it engaged in "generous" cost sharing with the NSF in agreeing to install marginally functional T-3 technology is unacceptable.

It is time for the NSF to acknowledge reality and embark on the 18 to 24 month time line mentioned by Eric Hood on behalf of FARnet so that the mid-levels may choose some combination of either interconnecting with each other or selecting commercial backbone services. Someone must be clear and state that a subsidized backbone ends on January 1, 1994. The NSF must focus a major share of its time meeting with FARnet and others to accomplish a coordinated change. Commercial, production backbones with subsidies to regionals for interconnection should emerge as one kind of awardee in the recompetition.

However, the other awardee should be a precompetitive research backbone connecting the major sites involved in the current gigabit testbeds. Major research universities not in the testbeds could apply to the NSF for grants for direct connection. Don't put the entire network on the bleeding edge. Let universities and corporations compete for that honor. If this backbone can not be brought online before 1995, it would not be a huge loss. (Indeed just what could be brought online by 1995 seems a bit uncertain.) However if the gigabit testbeds perished during a never ending fight between ANS, the midlevels, and the commercial providers we would be wasting an *important* resource.

Congress should instruct the NSF to develop a plan and a budget to work with CNRI to maintain the testbed momentum and turn it into a small scale national research backbone by 1995. *There* is where any federal money spent for backbones and new technology development should be focused. The current situation is win loose. Either a commercial network or a "precompetitive" R&D network is imposed on the entire community. Supporters of each side spend most of their time struggling to see that their views predominate.

It is time to stop the warfare and go for a win-win solution. If the NSF really wants to go for a leadership role in developing the most broadly defined vision of the NREN possible, it will see the merits of following both these directions. If it takes more money than would be required by continuing the special relationship with ANS, so be it. Let the NSF put ANS on notice: a mistake was made. It will not be continued after January 1, 1994.

When private industry offers the government a special "money saving" deal, if it is given in return a unique benefit, no one is well served. If ANS cannot compete in the market place by 1994, it can certainly not complain that it did not have a special opportunity that PSI and Uunet did not have. However the NSF must also make it very clear that it no longer sanctions attempts by ANS to acquire commercial customers and charge any midlevel "com-bits" as a result. If ANS is to be paid for provision of backbone service until 1994, it must accept a *quid pro-quo*: an immediate end to its special status.

NREN does have two policy drivers. It is time to implement a separate plan for supporting each rather than a single plan that leaves no one satisfied.

The NSFnet Backbone Acceptable Use Policy: Whose Interests Are Served?

Congressman Boucher queried Mike Roberts and Doug van Houweling on the NSF Acceptable Use Policy (AUP) that prohibits commercial use of the NSFnet backbone. (The mid-levels have their own AUPs that have relatively little restriction on commercial use. As a result the national backbone becomes a bottleneck.) Roberts and van Houweling said that while the backbone AUP might be subject to occasional abuse such abuse was under 1% of total usage. They concluded that situation was handled well by scrupulous self policing of network service providers and users.

Self policing is a polite way of saying that it is up to everybody to make their own interpretation, which means that the most law abiding people are the ones who have the least use of the network and the ones who complete disregard [for the AUP] do whatever they want. - Kapor

Kapor: "I wish to make a very different characterization of what I have just heard. . . . The fact of the matter is that, because of the success of NSFnet and of the midlevels, the fact that there is a general awareness of an AUP does not prevent the network's users from conducting their life's business on it. . . . Self policing is a polite way of saying that it is up to everybody to make their own interpretation, which means that the most law abiding people are the ones who have the least use of the network and the ones who complete disregard [for the AUP] do whatever they want."

"Electronic mail is the most popular application on the Internet. Its contents are generally, and in fact legally, with minor exceptions, private. So who is to know when I send a message to you, is it in service of research and education? . . . . If you look at discussions on Usenet news groups and mailing lists and if you look at the contents of FTP file areas, there is no principled way to say that what is going on is in conformance with any reasonable interpretation of AUP."

"Businesses, which wish to go the net to offer information services, suffer because of the AUP - because as businesses, they have potential liability. If I were to start a business to serve the research and education community on some fee for service basis, I wouldn't do that because I would be aware that somebody could come after me for not being in compliance. So the sole result of the AUP in my opinion is to deny the users of the network a chance to have the kinds of services which will make it more useful".

Boucher: "If you are an information services provider to the research and education community, you are in business. You are not offering those services for free. . . Under the current AUP there is no bar for having those services over the NSFnet. You simply have to pay for having those services carried. So why does the acceptable use policy as it exists today serve as an inhibition for those service providers using the network?"

First of all we have to go through ANS. We are forced to deal with ANS... and they set the terms, the prices and fees. This is not free and fair competition.. . . .However it is viewed, as a policy matter, it is inappropriate to require all info-service providers to go through a single carrier. . . Yes, I do think the terms are unreasonable. - Kapor

Kapor: "May I respectfully disagree with your characterization: First of all we have to go through ANS. We are forced to deal with ANS. . . and they set the terms, the prices and fees. This is not free and fair competition."

Boucher: "Is ANS discriminating against information providers and charging them an inappropriate amount for use of the NSF network?"

Kapor: "However it is viewed, as a policy matter, it is inappropriate to require all info-service providers to go through a single carrier. . . Yes, I do think the terms are unreasonable."

Boucher: "Why does it bother you that a central entity manages the network. Is it because that entity also offers its own commercial service?"

Kapor: "It's in part that. I would make a point that while in the pre-digital era, it may have been necessary to have a single manger of the network, the overwhelming trend in telecommunications has been towards competition and deregulation such that, in telephony, we are down to the question of how do you create competition in the local exchange?"

"It is possible technically, given computer based communications, to have multiple interconnected quadrants and still have an operable network. I won't say it is trivial, but it is certainly possible, and there is a consensus in general that this is the desired direction."

Boucher: "Let me ask you this. There are other networks available, are there not?. . . . Why is it that is someone doesn't like the service given by ANS can simply go to one of the other backbone services currently available."

. . . one of the functions of the CIX is to provide such an interconnection. At the same time because regional networks get a free interconnection to NSFnet they are disinclined to pay for an additional connection to the CIX. - Kapor

Kapor: "Well this is possible to a degree and one of the functions of the CIX is to provide such an interconnection. At the same time, because regional networks get a free interconnection to NSFnet, they are disinclined to pay for an additional connection to the CIX. . . And if you will just follow a 15 second analogy. The personal computer industry took off from zero to a hundred-billion-dollar industry in large part because third party providers of applications and services like Lotus could enter in and did not have to seek permission, sign a contract, or have any business relationship with the likes of IBM or Apple. They simply hung out

a shingle as it were and you got tens of thousands of competitors providing applications which stimulated the development of the industry. We need to lower barriers to entry for applications and service providers by creating a level playing field and multiple competing carriers because that is the only way we are going to get innovation in the higher level applications and services. We can be very good at pushing bits around at a very fast rate but if you happen to sit down and talk to one of these users what can you do? You must negotiate this obscure and arcane bafflegab in the extreme. And I would claim that by doing the maximum to encourage private sector investment in developing applications and services is the fastest way to solve this problem. The only way that this will happen is by opening up the playing field and providing real competition."

My first point is is that there is not a monopoly here. The second point I'd like to make is that its precisely because the foundation requested of MERIT that the network be open to the type of commercial access that was just discussed that we created ANS and ANS CO+RE services so that within the acceptable use guidelines we can provide an open path for commercial traffic to the research and education networks. - Van Houweling

Van Houweling: "Dr Wolff says he is willing to discuss with any network services provider, provisions for attachment to the sites at MERIT. My first point is is that there is not a monopoly here. The second point I'd like to make is that its precisely because the foundation requested of MERIT that the network be open to the type of commercial access that was just discussed that we created ANS and ANS CO+RE services so that within the acceptable use guidelines we can provide an open path for commercial traffic to the research and education networks. It is precisely those objectives that we share for which we are now being criticized."

Boucher: Is it also true that if some other provider of network services desires to connect information service providers to the NSF network that he will be able to do that? In other words is it necessary that the offeror of such services deal with ANS CO+RE or can they deal with some other provider of services?"

Van Houweling: "It is absolutely the case that a provider of services can deal with any of the networks connected to the ANS run backbone services. They can go directly to a regional."

Kapor: "Respectfully I have to disagree with that characterization. There is a very well known database provider called Dialog. They originally signed up to be a commercial customer of ANS. After a very short period of time, they backed off that and changed their status to be research and education customer. The reason was that hardly any of the regional networks have signed the agreements that ANS has attempted to permit commercial inter connectivity."

While it is wonderful to be able to call Dr Wolff and get individual exceptions to the policy that has been done on numerous occasions, that in my view is an inappropriate national level policy for the commercial development of the network. We should not have a bottleneck of individual permissions granted by the NSF. I see no reason for that what so ever. The time for that is gone. - Kapor

Given that lack of agreement, Dialog was forced to employ the same fiction as everybody else in saying that we are not commercial, we are just serving research and education. I take that as proof that the ANS model for developing commercial services, while well intentioned, is vastly inferior to the situation in which you can have multiple carriers competing with each to attract commercial services, which they are just not able to do. While it is wonderful to be able to call Dr Wolff and get individual exceptions to the policy that has been done on numerous occasions, that in my view is an inappropriate national level policy for the commercial development of the network. We should not have a bottleneck of individual permissions granted by the NSF. I see no reason for that what so ever. The time for that is gone."

During the final panel the following exchange between NSFnet Director Steve Wolff and Congressman Boucher occurred:

Boucher: "Now as you are putting this recompetition together are you planning any changes in the acceptable use policy? Will that be a part of the recompetition? We have heard some of the witnesses here earlier today say that a lot of the competitive problems that they see existing at the present time could be successfully addressed in this recompetition. Is it your intent to take that into account?"

Wolff: " I think that there is some misunderstanding. As a matter of fact I know that there is. There is no prohibition against the distribution of fee for services over the network for research and education purposes and indeed many commercial information service providers - Westlaw, Mead Data services, the Well, distribute their services over the backbone for research and education purposes. It is not necessary for these providers to go to ANS and because we allow unrestricted access to the NSFnet backbone for research and education . . . anyone may have connectivity."

Boucher: "One of the recommendations that have been made, and this is not a recommendation of this subcommittee, at least certainly not at this time, but just for purposes of discussion I would like your opinion - what would be the effect if you were to say as part of your recompetition that the companies, who were your successful awardees for routing authority on the one hand and circuits and switches on the other, can not have any role in offering a commercial service that is carried on the NSF network as a way to ensure absolute fair treatment. I'm not saying that it is the only way to ensure fair treatment but it may be one. What is your response to that potential? Have you given any thought to that as you restructure this competition?

Wolff: "In terms of the providers of lines switches and new technology we would certainly take that under consideration. I believe off the cuff - no I don't think I want to make a comment off the cuff. [Appreciative laughter from the audience.]

Subsidies (con't from p. 3)

generally not developed in a production network. Roberts wants to make sure that his constituency gets as much money as possible to develop new technology. Participants in the gigabit testbeds would normally take what they had learned and release it as a commercial product in commercial networks, such as a commercially mature CIX or NSFnet. If the NSFnet were treated as the development network rather than as a production network, it would be likely to bring more dollars to bear on the academic computing constituency that Roberts represents.

In his final remark Roberts has twisted the focus from institutions to individuals. Kapor had just made it clear that he was calling for aid to institutions not to broad classes of individuals. Of course to suggest that anything in Washington is tantamount to a new entitlement program is to give it the kiss of death.

Tilted Playing Field
(con't from p. 5)

and that this means that it can charge a lower rate than its competitors and still make a profit? Is here any validity to that argument at all?"

Hood: "I certainly agree with the argument hat there is an economy of scale in the provision of a national network, and given that argument, certainly the carrier or provider with the largest number of attached institutions is going to have a smaller marginal cost of attaching additional institutions."

Boucher: "That does in fact create a competitive disadvantage for ANS's competitors?"

Hood: "It may. I guess I would like to emphasize that we are in a precompetitive environment. We have not yet reached the stage that internetworking is a commodity that can be sold off the shelf and be readily used in all areas of our society."

NEW Members of the Internet

From the Editor:

As space permits each issue of the *COOK Report* will contain a listing of some of the new sites added to the NSFnet or to the world wide internet during the preceding month.

On 3/27/92 the following network additions were announced by MERIT

T1 Network:

Net #	Net Name	Primary	Secondary	Location
157.233	VALVERDE	1740	754	Val Verde Unified School District, 975 E. Morgan Road, Perris, CA 92571, USA
157.181	ELTENET	590		Eotvos Lorand University of Sciences, Puskin u. 5-7; H-1086 Budapest, HUNGARY
157.123	ZDS-NET	1384	1383	Zenith Data Systems, Buffalo Grove, IL 60089, USA
153.40	CITIBANK-NA	701	702	Citibank, Floor 32, 909 3rd Avenue, New York, NY 10022, USA
147.127	FNET-N7	1238		ENSEEIHT, Ecole Nationale Superieure d'Electronique, 2 Rue Camichel, 31071 Toulouse Cede, FRANCE
146.254	ZFE-SIEMENSD	701	1238	Siemens AG, Otto-Hahn-Ring 6, W-8000 Munich 83, GERMANY
146.110	HUNGARNET	590		Computer and Automation Institute, Hungarian Academy of Sciences, Victor Hugo u. 18-22, H-1132 Budapest, HUNGARY
143.55	FASHION-TEC	174	750	Fashion Institute of Technology, Computer Center, 227 West 27th Street, New York, NY 10001, USA
142.55	SHERIDANNET	601	602	Sheridan College, 1430 Trafalgar Road, Oakville, Ontario L6H 2L1, CANADA
192.109.26	BESSY-DE	701	1238	BESSY, Lentzeallee 100, D-1000 Berlin 33, GERMANY

192.94.78	VONKARMAN2	590		Von Karman Institute, Ch. de Waterloo 72; B-1640 Rhode St. Genese, BELGIUM
192.93.46	FNET-CRBGC	1238		Centre de Recherches en Biochimie et Genetique Cellulaire, 118 Route de Narbonne, 31062 Toulouse CEDEX, France
192.86.14	POLHEP	590		Institute of Nuclear Physics, Polish Atomic Energy Agency, High Energy Physics Department, Cracow, Kawiory 26A, POLAND
192.77.59	CRIM-CNET11	603	601	Centre de Recherche Informatique de Montreal, 3744 rue Jean-Brillant, Suite 500, Montreal, Quebec, H3T 1P1, CANADA
192.75.203	OUACNET	601	602	Ontario Univ., Box 1328 650 Woodlawn, Rd. W. Guelph, Ontario N1H 7PA, CA

Total NSFNET T1 announced networks: 4957

T3 Network:

Network IP: 143.55
Network Name: FASHION-TEC
Location: Fashion Institute of Technology, Computer Center, 227 West 27th Street, New York, NY, USA
Country Code: US
1:174 NYSERNET Regional Network / PSI

Network IP: 157.233
Network Name: VALVERDE
Location: Val Verde Unified School District, 975 E. Morgan Road, Perris, CA 92571, USA
Country Code: US
1:1740 CERFnet

Network IP: 192.150.186
Network Name: UCB-SEQUOIA1
Location: University of California, Berkeley, EECS Department, Project Sequoia, 571 Evans Hall, Berkeley, CA 94720, USA
Country Code: US
1:200 BARRNet
2:201 BARRNet

Network IP: 192.150.187
Network Name: UCB-SEQUOIA2
Location: University of California, Berkeley, EECS Department, Project Sequoia, 571 Evans Hall, Berkeley, CA 94720, USA
Country Code: US
1:200 BARRNet
2:201 BARRNet

Packets (cont. from p. 6)

and allow them to purchase backbone services where ever they choose rather than requiring them to connect to one NSFNET backbone. This will really only push the problem down one level, since the playing field for the regionals is no more level than the national playing field. The NSF arbitrarily decided five years ago who they would support for 'regional' networks and they have been unable to find a way to let anyone else into the club."

"If the NSF simply distributes money to the existing club members, there will be serious problems. A new storm of protest will arise, not from PSI and AlterNet, but from the emerging state networks who promise to be as robust and scrappy as anyone in the CIX. The whole phenomenon of state networks has been pointedly ignored by NSF -- just as they ignored PSI and AlterNet until they could do so no longer. Is history destined to repeat itself forever within NSF, or can they find a way to fix their models and processes not just their current problem?"

About the Editor - Publisher

Gordon Cook has a doctorate in Russian history but has been "in" the computer industry since he joined the Electronic Information Exchange System (EIES) from NJIT in June of 1980. He was the Science Editor at the John von Neumann National Supercomputer Center from 1987 until its closure in 1990. From September 1990 until March 1, 1992 he was Project Director of the United States Congress Office of Technology Assessment study of the National Research and Education Network. In November 1991 OTA expected to release its NREN study in May. As of March 1992 it anticipated release in August.

Subscription Information

Twelve "hardcopy" issues of the Cook Report will cost $75.00 for individuals and companies or government agencies with operating revenues of $10 million or less per year. The cost for larger entities is $300.00. The Cook Report will be available in electronic form to subscribers who sign a hardcopy pledge not to redistribute it further. Subscribers at the $300 level will receive for no extra charge the 35 page (170,000 characters) desk top published report: *The National Research and Education Network: Whom Shall It Serve?* Others may order this document separately at $25..

Future issues will focus on the Telestrategies April 21 -22 Conference in Reston, the plans for a Community Learning Network, and the development of EINet. Beginning with issue #2 the *Report* will offer with every issue a listing of new institutional attachments to the network. Subscriptions are payable by check to Gordon Cook. Foreign hardcopy subscriptions are $125.

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