

# The COOK Report on Internet → NREN

Vol. 1, Number 2, May 1992

## Community Learning Network: Can a Flawed Vision Be Salvaged?

A Critique of the CLN Program Plan  
- by Dave Hughes

### The Rumors

Washington, and discussion groups online concerned with Education and Telecommunications, are abuzz with talk about a proposed 'Community Learning Network' sponsored by the US Chamber of Commerce, and presented by its drafters as "A Concept for a National Learning Technology and Information Delivery System."

The buzz became even more intense when it was learned that Dr. Allen Bromley, the President's Science Advisor had apparently endorsed the plan. And Congressmen in Washington, who are expected to pony up at least \$40 million to jump-start the plan, are being briefed and lobbied.

I met briefly, in Washington with the author of a written form of the plan, Lt. Col. James Carey of DoD, who is listed as the Executive Director of the Working Group. He contracted with me to show and discuss with him several telecommunications technologies I had implemented in K-12 education in Montana, and Colorado. I have not attended any of the briefings or question and answer sessions that have occurred inside the Beltway, which the advocates of this plan have used to seek powerful supporters.

The summary and critique below is based upon the written, 125 page draft which was circulated December 21st,

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## Maloff Says ANSnet and CIX Are Likely to Interconnect

According to Joel Maloff, ANS VP of Client services, ANS is likely very soon to agree to interconnect with the CIX. However, ANS will not join the CIX because it believes that the CIX does not wish it well. In interconnecting with the CIX it will, for the next year, not insist on settlements for com-bits. It still believes, however, that some sort of settlement process is necessary and will continue to negotiate towards that end.

When I asked for further elaboration, ANS faxed to me the following Draft

(Continued p.10)

## In Offering COREN MCI Appears To Be Competing with ANS - Its NSFnet Backbone Award Offspring

Many have wondered what MCI thinks of its strategic alliance with IBM that led to the controversial offspring -- Advanced Network and Services. It appears that MCI has decided that some competition with itself may be a way to spread out the risks of its investment. It has very quietly launched COREN - Coalition of Research Networks in partnership with SURANet the largest of the NSFnet mid-levels.

At the April 21-22 Telestrategies Conference: Internet - A Government Net-

work Going Private, Jerry Edgerton, VP of Government Systems for MCI gave a presentation: "Telco and IXC Participation in Internet Infrastructure." The third of five items on his first slide was SURANET/COREN. When asked to elaborate, he explained that MCI and SURANET had an agreement to market MCI's services in providing backbone services for mid-level networks to use internally and [more significantly] services that could be used to build backbones *between* mid-level networks.

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1991, and not on any of the rumors circulated about the proposal.

## Basic Elements

The heart of the CLN plan is contained in five basic ideas:

(1) In each community there will be established a learning center at the community level, with a high degree of 'community' support and use. Each site incorporates a variety of learning technologies available, using satellite communications in every (initial) case and piping their data into two classrooms. In effect each center becomes a sort of community-learning teleport. As such the centers are conceived as 'public' community information utilities.

(2) Each center has an 'Interactive' Video Classroom, and a Computer Classroom, equipped to handle technologies of 'computer assisted programming, interactive audio, audio graphics, interactive video and, almost as an afterthought, modem communications for 'remote access'. The centers are linked to each other by satellite, and to a National Resource Center centralized computer system which stores all sorts of information to be 'delivered.'

(3) The centers are primarily designed to serve (a) the retraining needs of Federal, state, and local government employees, including local military personnel, especially of the Reserves and National Guard (b) retraining of business employees, especially small and medium sized businesses (c) the general educational needs of K-12 students who need access to high-tech equipment and remote resources and teachers.

(4) Leadership in creating the centers to come from active Chambers of Commerce, who will recruit and train 'Chamber of Commerce Service Fellows' who will insure maximum utilization of the Community Learning Network.'

(5) Initial funding comes from a \$43 million Congressional appropriation. Interim funding comes from federally guaranteed loans as well as revenue from fees by those who use the center. Long term funding comes from the concept of 'shared use - shared cost' where government and business users pay a modest center use fee for using the centers, while local schools pay little or nothing for student education.

Each site is budgeted at \$263,000, with a 25 station interactive classroom with Ku band Video feed, a 25 multimedia workstation plus two teacher classroom, data storage and retrieval computer. With monthly site-operating costs of \$7,315.

The national project would proceed in two phases, Phase I being the establishment of 120 such sites in 3 years - which is also the 'proof of principle' period, to be followed by Phase II growth aimed at doubling from 2,000 sites in 1995 to 465,000 sites by the year 2000. The first part of Phase I is to be 20 sites within one year ending in 1993.

The first 20 sites, and the national infrastructure to be funded by \$43 million from Congress, while the next 100 sites are planned and deployed. And as revenue starts coming in, to capitalize the next series by corporate donations as well as loans secured by Congressionally modified Sallie Mae federal loan guarantees. Until all 110,000 schools are covered by at least by one site.

The hardware for the first 20 sites is budgeted at \$5 million, with a \$21 million cost for the next 100 sites. Software, maintenance, staff costs are factored in. With satellite node costs of \$1.7 million, annually. KU-band equipment with both 56kb and 256kb data-rates are planned for the satellite links to the centers.

The open architecture of the systems, it is asserted, will insure their compatibility with 'NREN' and 'The Internet.' But more specific technical details beyond this center-functions, center-layout, and technologies-included are not included in the study I have.

The 'criteria' for initial city-site selection is that the area has a 'large' Federal presence, large population, an active Chamber, school districts with computers, high-tech local culture, and a large number of 'enlisted personnel.'

While I am told the first 20 sites have been selected, but not revealed, the study shows a typical selection for one state - California. Two in each of San Francisco, San Diego and Los Angeles. One each in Sacramento, Fresno, Anaheim and San Jose.

Much is credibly made in the study of the huge annual costs to business and government to train its personnel. With big numbers just for travel and

per diem. DoD spent \$2.7 billion in 1991 for travel and per diem, out of \$19.8 billion for all training. The private sector is reported in the study as spending \$210 billion a year. The rates charged by the learning centers are small enough in comparison to what military and business do spend for training and travel so that the total center charge would be perceived by its users as a savings in comparison to what they would have to spend if the centers did not exist.

Business and government users of the centers would be charged \$87.50 per classroom hour for the 25 student Video Classroom, and \$3.50 per student hour for the computer classroom. Elaborate tables of figures, based on a 37% usage factor, the operating costs, and expected revenues are the basis for a total cash-flow analysis of project needs for the first several years.

Provisions are written in for evaluation of the methods and technologies, quality control, development of curricula, and refinement of selection of technologies for successive groups of centers.

The plan is 'strategic' in scope. . . . It aims at a 'national' level attack on the triple problems of business, government employee, and K-12 technology based education. And deals with the sponsorship, funding, phasing, and facility-usage questions directly and comprehensively.

Finally, a non-profit corporation will be formed to provide the legal corpus for implementing and managing the network. The Community Learning Network, Inc. With major national organizations - from the Corporation for Public Broadcasting, and the U.S. Chamber of Commerce, to academic institutions and professional groups. CLN, Inc would be headquartered in Washington, DC, and initially be staffed by 13 persons. Then there will be separate 'customer' (Federal, Business, State and Community, Academic) support, Users Groups who will negotiate and handle user organizations.

## Overall Impressions

The plan is 'strategic' in scope. Seeking to provide for a concept that could be replicated in cities across the land, financed - first by Congressional start-up funds - then by its own reasonable fees-for-use by business and government - which also pays for school use.

It certainly aims at a 'national' level at-

tack on the triple problems of business, government employee, and K-12 technology based education. And deals with the sponsorship, funding, phasing, and facility-usage questions directly and comprehensively.

### Centralized, Pre-packaged Courseware

The plan is very short on pedagogical details - except as implied in giving access to specific telcom and multi-media tools, which are interconnected to distant resources. There seems to be the greatest emphasis on 'delivery' of educational/training materials from centrally stored computer banks. In this respect it closely fits one educational model recently described by Dr. George Johnston of MIT as:

" ... a preference in some quarters for ... communications software fundamentally structured for the delivery of large-scale pre-programmed educational "units" to huge numbers of classrooms with minimal initiative or intervention by teachers... this approach conjures up visions of giant pipes carrying ...golden grains of knowledge, or at least experience. The pre-programmed educational "units" will necessarily be cast in a form similar to the familiar acid rain and water pollution projects."

While many of us who are quite experienced in conducting formal courses for business persons, professionals, teachers, and K-12 students via telecommunications are not enamored of 'content delivery' models of education, the model inherent in the adopted technologies being used by Community Learning Network does reflect widely-used classroom-centered, multi-media presented, satellite linked 'distance learning' classrooms and classes.

Except for indirect references to 'home-bound' students and parents, there is very little evidence that the operating concept for the centers puts much emphasis on students accessing information with telecom from anywhere except their school, or at the center itself. Thus, while the Community Learning Network centers take the students out of their schoolrooms, it puts them into another high-tech schoolroom, traditional in that it envisions students at desks, with teachers in front. It is only non-traditional in that all desks-tables have networked multi-media devices, to and from

which distant resources and people can be accessed.

While the scheme envisions development within entire 'communities' (is Los Angeles a 'community?') orchestrated, not dominated, by Chambers of Commerce, the plan does not address controversial educational 'jurisdictional' issues. It simply makes the centers available at the community level. Who decides what districts, schools, classes can use the facilities, in what priority, is not clear. For as mentioned below, the size of each center is not big enough to accommodate more than a fraction of a city's school population at one time. This policy question is translated into more a matter of 'scheduling' and time-block allocations, than educational priorities.

The shared-use, shared-cost concept is imaginative. For while addressing the separate needs of separate sectors, it is able to incorporate funding schemes which address both the educational, capital-equipment, and financial-reality needs of K-12 schools in any community.

And the long term public-private financing, in which Congress has a role, not only in initial seed-money financing, but in modifying laws for Sallie Mae loan guarantees, gives the plan a permanent, rather than transient, cast. With the minor exception of reminders of re-training 'enlisted men' of the Armed Services, Reserves and National Guard, it is not government 'Agency' biased.

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The inclusion of the military training needs may be a practical recognition that, while the military, including 'community' based reserves will have training needs, that significant dollars to support the centers may be more available from that sector, than any other. That implicit assumption seems reinforced by the anticipated revenue sources for 'shared usage'. 40% from 'Federal Agencies,' 20% from State

and Local Governments who use the centers, 20% from small and medium businesses. 10% from 'academia', and 10% from 'parents and home-based' users.

### Oversold Benefits and Scope

In several sections of the 10 part plan document, the authors seem either carried away with the possibilities of telecommunicated education in cyberspace, or were just brainstorming out loud. In these sections the centers are purported to be able to cure everything that is wrong with creaky Industrial Age America but flat feet. Such as the use of the center for business plan development, encouraging entrepreneurship, creating a demand for '50 million' more computers which 'could be manufactured in the United States in the next 8 years.' Its giving of equal access to the 'underrepresented' (minority) portions of our population. And the creation of 'community forums.' And even will contribute to Arms Control!

The trouble with these enthusiastic catch-all predictions of fundamental changes that will occur wherever a center is created, is one of the actual limited physical size and capacity of any one center - accommodating no more than 50 to perhaps 100 persons at any one time - in comparison with the size of the cities in which they, in order to carry out the shared use and self-sustaining economics they demand, must be put in.

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where the adult 'students' already have learned how to learn.

And of course it goes without saying that the Centers are not designed to 'extend' the technologically based education to laboratory, fabrication and experimentation, or field work.

By far the biggest cost - both time and dollars - is the learning curve in technologically based education. And the conversion of materials to the new media, the development of curricula which looks and feels like no 'classroom based' curricula ever did. And the development, over time, of teachers and mentors competent to teach skills, impart knowledge, and deal with the psychological problems that distance learning entails.

If I were given \$43 million dollars to seed-money start the reformation of education and training in America, using the community center concept - which has substantial merit - I would spend \$30 million teaching the teachers and staffs how to teach using \$10 million worth of such tools.

But when one reads the plan, it was obviously intended to present a very broad and sweeping proposal, built on the key ideas of telecommunications-linked 'community' centered, serving a wide range of training and educational needs, and deriving its self-sustaining and capital-expansion funding in the long run from shared use by local business and government, whose local entities in effect, subsidize local public schools. Thus, if one disregards the lack of details, and far too much sociotechno-hype in the document, it is clear that the authors were not casting the plan in concrete, beyond those key elements above. They were in fact presenting a comprehensive and novel 'concept.'

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So, flawed as the draft plan might seem, because it actually addresses, at a national level, a national education and training need for a technological society, using politically neutral community-based technological centers, it is easy to see why it could look good to Congressmen and Administrations

(especially in an election year). The less readers know about how these technologies actually work in learning settings, how much time it takes to master such tools, and how such 'communications' environments inevitably challenge, the more impressed they will be.

That's the good news.

## Serious Questions

Now for the bad news.

Because it does not really make clear just what unique 'information' or distant teachers or experts will be uniquely accessible from the Centers, or who selects just what is available on the National Resource, or Regional Center computers, it is hard to see School Superintendent's leaping to use the centers. It is one thing to access the Library of Congress, or the Smithsonian, through a network - satellite, Internet, or dial up modem. What these places have is well understood. And low cost access to them with advanced tools would be welcome. But the plan almost entirely seems based on the idea of 'separate' resources linked, and controlled (chosen) by experts associated with Community Learning Centers. Or requested by those using it.

One wonders why the authors did not see the Centers and their technical links, as linking the already-existing host systems all over the world. (Perhaps it is lack of familiarity with how Bitnet and the Internet actually work (ftp and telnet login from any user on any host, with local permission), and how everything is getting connected to everything else.) As of January, 1992, 727,000 host systems in 50 nations were linked to the Internet. And organizations like the Library of Congress are themselves 'accessible.'

## Jurisdictional Problems

So just what separate purpose, unless it be for technical data (graphics, for example) translation, the proposed National Resource Center computer has, beyond administration which certainly will justify a central system, is not clear. The whole trend in information technology is away from huge, central data bases, and toward decentralized storage systems, all linked together, and with smart-agent software, such as knowbots, and other tools like wais, archie, and whois, being sent by users to fetch information, wherever it

might be out there in cyberspace.

So a question is, what are the qualifications of the people who actually will operate this National Resource Center, what is their criteria for selection, and where do the already-extant institutional 'information and education' centers fit? For the Community Learning Network seems to represent itself as existing independently of all other institutions. One must ask why are we making indeed, a 'new institution' rather than implementing a new network which is there to give (1) affordable access and (2) connects up existing educational, library, resource institutions and expertise.

Educators - the same ones resisting school vouchers, and the President's America 2000 which this plan gives full credence to, and the New American Schools Corporation - are likely to interpret this plan as another effort to create an alternative educational system. Frankly, we are in such miserable shape in US education, that doing such a thing might not be a bad idea. But I judge that School Districts, might be pretty lukewarm to seeing local Community Learning Centers as the hot answer to their educational woes.

I am not sure what to make of the lack of mention of specific 'role' for universities, colleges, both general and community in the plan, or a clear relationship to the centers. They are scarcely mentioned. But since 'teacher education' is a function of 'higher education' and since telecommunications is being used now to link the faculty and resources of universities to both teachers and students, K-12 in a variety of ways, just what the Center concept will do to these relationships is not clear.

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ers and accreditation of schools and curricula is likewise vested in specific authorities at local, state, and regional levels.

While 'distance learning' holds great promise for the improvement of that portion of education that can be dealt with by advanced communications and display technologies, no one seems to come to grips with these precedences, some of which can only be resolved by local and state, not Federal, legislation and administration. And this plan avoids this difficult, but in the long run central, question. In other words, if the Community Learning Centers are used so heavily by schools that they have a major impact on education of our youth, the question of accountability arises. If they are not used that much - but more like special school trips to the field for study away from school - they may not make much of an impact.

On the other hand, small and medium business might find the centers attractive. Their training needs are usually unique, short term, directly related to the business. And control is vested in the company. Big businesses might not find the centers useful, because they frequently have highly developed training centers of their own. But is local business uses them cheaply, the strategy could backfire. If local Community Colleges, and even Universities, which historically set up special programs to serve the training, and educational needs of local business, see these centers as subsidized competition to themselves, there could be polarity within the community.

These 'jurisdictional' questions are less a criticism of the plan itself, than an indictment of the expected 'turfirm' of existing institutions, which is both legal educational 'accountability' and political reality. But the plan does not really address this aspect of what is intended to be a major answer to currently inadequate, and underfinanced, technologically based education of public school children. The plan seems to leave resolution of such problems to the states and communities themselves. A questionable strategy.

### Who Shall Be Reached?

There is an inherent problem in the plan's dependency on the high density of both government and business or-

ganization for the funding of a center. The plan seemingly - with a capitalization cost of a quarter of a million dollars for each center, and for paid usage by government and business to support the school use of it - cannot easily 'scale' into medium or small towns, much less rural areas. The shared-use shared-cost concept with 40% of the revenue coming from government and military personnel use of a center could conceivably work in a Los Angeles, Denver, maybe even a Wichita. But there are far more medium cities without any federal or military facilities of any size, than those that have them. And small towns are just that - too small to justify the costs of a center. What about them?

When one looks at the capacity of the Center's two classrooms - a total of 50 student seats before a multi-media device - one is struck by an anomaly. How can a 50 seat facility serve the school-population needs of cities large enough to support a center? Since there are no calculations as to the percent of the US school population which can be served by such high-tech centers, I have analyzed the use of one center in my own city - Colorado Springs. Except for sheer size - 300,000, it fits all the criteria for the placement of centers. Large Federal employee population, both civil and military, a high-tech work force, numerous small, medium and large firms, computer-equipped schools, and an active Chamber of Commerce. It could probably support, financially and with shared-use, one 50 seat center.

Central School District 11 in Colorado Springs has 55 K-12 schools, with 30,000 students, and an average of 21 students per class. 10,000 of them are in the 15 junior and high schools in the central city.

With the centers being available to schools at any time during school hours, that means the two Center classrooms would be available 6 hours a school day. If a series of science teachers build a 16 week semester courses around the use of the center as designed, with one hour visits to the center for a class of from 20-25 students, twice a week, then approximately 24 such classes can be accommodated per semester, or 48 in a school year. The individual student would have access to the advanced tools and technologies of the center for a total of 32 hours in a year. Or 1,000 students from the 12,000 Junior High and High School students in Colorado Springs in any given year could be served.

Even in 6 years (8th grade to gradua-

tion) all students in Colorado Springs, a city of 300,000 would not be able to take a one semester class there. It would take two centers to permit all students to take at least one 32 contact hour course there. But even two centers in a city like Denver, with a metro population of over 2 million and corresponding school populations would not come close to transforming the education of central Colorado. And Chicago? This disparity in the direct capacity of the centers against the size of school populations, in a concept centered on physical dependence on high-tech tools in costly centers, is troubling.

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### Use of Modem Communications

While the use of modems with existing computers in the schools, and accessing the center over ordinary phone lines, is mentioned in the study numerous times, details are lacking. At one point the study even says "Remote sites will also receive information and video images with only a computer and telephone connectivity." What technology is intended to be used for this is not made clear in the study. The overall focus of the concept seems to be on the value of study in the centers themselves, as tightly scheduled classrooms, where the most advanced technologies are situated and most of the 'learning' takes place.

But it is clear that there is a widespread movement in the US toward use of local school LANs, high-performance modems, servers, that link the schools and students and teachers in them to the Internet or, as in the case of Texas, TENET, or in Montana, the 17 distributed Fidonet

systems in METNET. The classrooms are virtual, not real. And expect a high degree of use - by teachers, students, parents, and 'community' persons - from homes and offices, not just classrooms equipped with computers and lines.

If the Centers were made nodes on the Internet and functioned with their own central computer, adequate modem ports, ISDN, medium bandwidth lines, or dedicated circuits or intermittent TCP/IP connections to computers or servers at schools themselves, then the problems of scale might be addressed. With v42bis 9.6 modems

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ports, ISDN, medium bandwidth lines, or dedicated circuits or intermittent TCP/IP connections to computers or servers at schools themselves, then the problems of scale might be addressed.

today, packet radio devices, certainly ISDN, image compression techniques, and either local linked uucp, tcp/ip, fido protocol, or point and offline reader software available for almost any Mac or MSDOS machine, it is certainly possible to 'distribute' resources, and give 'shared' access to many distant resources, human and otherwise. And even smaller and remote towns can be served without exorbitant communications costs. Centers can serve far more people. And probably do it for less than the schools can do for themselves.

Even Mac Classics can, and are being used, in places like rural Montana, (72 of them) under the Star Schools program, linked by satellite, and high speed modems, to remote teachers, with bit mapped graphical images being transmitted along with text. So it is possible to link the Center satellite feeds to area schools. Then, in the Colorado Springs schools example, all 9 Junior High and 5 High Schools could be served at once. This could be done with the Center's classrooms used for specialized courses, or perhaps teacher training in the technologies.

As a matter of fact, American education will not change - no matter how much technical and telecommunications equipment is made available, or where - until teachers are extensively educated in, and by, the new technologies. The plan does not recognize just

Continued (p. 11)

## Purpose of The T-3 Backbone - To Accommodate Growing Traffic or Serve as Testbed for IBM Router Development?

The T-3 backbone continues to confound most observers. Consider what I learned from Cisco at the Telestrategies Conference April 21 and 22nd. In November of 1991 Cisco began shipping a working clear channel T-3 router. I mentioned that I had heard people from the NSF say in March of 1992 that there were no commercially released routers that would do what had to be done on the T-3 backbone. Did Cisco's product have some deficiency?

Absolutely not said Cisco's Ed Kozel. It would do everything necessary on the NSFnet/ANSnet T-3 backbone.

Well, it was being used? ANS had said that it was using Ciscos colocated at MCI POPs on the T-3? Did Cisco agree?

Well.... sort of. The T-1 safety net backbone that connects to the T-3 as a backup for T-3 failures is linked to the T-3 at 56kbs. Cisco routers are used on that linkage, Kozel replied.

But what about the T-3 routers?

Some were used in the ANS test network was the answer but none in the "production" network.

One wonders why.

Perhaps finally all 16 nodes are peering with each other? And perhaps the net is complete and that IBM's betatest T-3s are no longer betatest? Nevertheless, the maximum throughput on the T-3 backbone in March of '92 was only slightly more than 5 megabits per second. If in May this speed limit is still in place, aren't we facing a situation where ANS -presumably on behalf of IBM - is using the NSFnet backbone as a *testbed* for continued T-3 router development rather than supplying the higher bandwidth *now* that supporters of the NREN vision continue to assert is necessary?

Ed Kozel said that my interpretation that ANS was using the backbone primarily as a testbed was perhaps unfair to ANS because in Dec 90 when they started to develop their T-3 routers, Cisco did not have its product out and ANS had made an awfully large investment in its prototypes. He could understand why it would hurt to dump them now and replace them with Ciscos. The desire to complete the testbed would obviously be strong.

But consider that the NSF is paying ANS an extra \$7 million a year for a backbone that some believe is being used primarily to benefit *product development* on behalf of IBM. Some might think it strange that the government, having announced that it needs much higher speeds on the net, is paying much more money for slightly higher speeds to an awardee chosen almost five years ago. I have heard some wonder, given the benefits to IBM, that IBM through ANS is not *paying* the National Science Foundation for the privileges it enjoys.

One of the staffer's from the House Science committee acknowledged that the concern that led to the hearings in March was ignited by the appearance that the NSF was not in control. The signs seem to be that it is still not in control. The Telestrategies meeting was an important conference where the NSF was the *only* major player that did not even appear. If the NSF were a private corporation, wouldn't we would have seen some major shakeups by now?

How did we get in such a log jam that representatives of the congress are saying that they can do nothing until they see what the NSF is going to do and the NSF responds by doing nothing?

## An Editorial - The View from the Telestrategies Conference

# Building the NREN: the More Things Change, the More They Remain the Same

Nearly three years after the decision to sell to the United States Congress a National Research and Education Network instead of just a National Research Network, "plans" for NREN remain stuck at essentially the same level of sophistication and detail shown in the 1989 three-stage FRICC implementation plan for the network.

### Talking Past Each Other While Pursuing Our Separate Agendas

The April 21-22nd Telestrategies Conference on Internet - A Government Network Going Private - presented a good snapshot of the continued lack of agreement. On the opening panel Mitch Kapor presented his usual eloquent plea that NREN be implemented with a level playing field that would enable the creation of a National Public Network. As the lead panelist, I then suggested that no one was in charge of network development as evidenced by the fact that the NSF (which at one time had been touted as the lead agency for NREN development) had asked OMB to stand in for them. I suggested that the NSF should accept the inevitable commercialization of the network by dropping the Acceptable Use Policy, removing ANS' special privileges, and preparing a plan to continue and connect the gigabit testbeds as the national precompetitive, *developmental* network.

Ken King, President of Educom, responded that relying on the gigabit testbeds would leave the NSFnet with a two or three year hiatus where no meaningful new technology development would be done. He then said that those in charge of NREN development did not know where they were going and presented the "plan" to get there -- showing a series of slides detailing the major stages of the 1989 implementation plan. The slides were essentially unchanged from ones that I had seen during the final quarter of 1990. In the year and a half since then the internet environment has changed dramatically. It seems strange to be working still

from plans that have not evolved or become more specific in two year's time.

Bruce McConnel, Chief, Information Policy Branch of the Office of Management and Budget, told the audience that he was indeed appearing as a stand in for Steve Wolff and presented the standard NSF view of the world: improving the technology of the network and providing connectivity for more and more of higher education.

Joel Maloff Vice President of Client Services for ANS gave a bland presentation on ANS' network services agenda. All participants received a set of 14 slides from ANS. The conciliatory tone of Joel's Call for Cooperation on slide one was in marked contrast to his presentation to FARnet in August of 1991.

Bill Schrader for PSI and Rick Adams for Uunet both complained about the difficulty of competing with the NSF supported mid-levels in selling network connections.

The most interesting point of the question and answer session came when someone from Ziff Davis asked about a scenario for a commercial connection to the network. Absolutely feasible, replied ANS's Maloff. Nope. Won't work and here is why, replied PSI's Schrader. But it will work, said Maloff. No it won't responded Schrader. Yes it will. . . . said Maloff.

You get the idea. . . .

### Acceptable Use - U.S. House of Representatives Offers a Non Solution

On the second day of the Conference John Sigmon, Science Consultant to the Technology and Competitiveness Subcommittee of the United States House of Representatives spoke. Sigmon said that objections had been raised to eliminating completely the commercial use restrictions on the NSFnet backbone. Consequently they had solved the problem by attaching a rider to all NSF legislation. The rider

said that commercial use of the NSFnet was acceptable "as long as it added value to the network." I asked whether the rider defined what was meant by adding value to the network? He answered that it did not.

So what have we learned from the March 12 Hearings on the Management of the NSFnet? Not much apparently. All we have is a solution for acceptable use that is really a non solution. Why?

1. It would clearly be improper for corporations to use a government funded interconnect system solely for the purposes of enterprise networking and the transport of proprietary data. However, because the security of data in the current Internet environment cannot be guaranteed, no corporation is likely to wish to save a few dollars by attempting to do so. Consequently those who do use the network do so because they wish to communicate with or provide service to the researchers and scholars connected to it. What is of value to me may be a nuisance to someone else. It is a gratuitous insult to the users of the network to ask a government bureaucrat to define value.

2. In the absence of a legal definition of what is meant by "add value to the network" we are still left with the Director of the NSFnet as the person who interprets Congressional intent on a case-by-case basis - not a sound way, as Mitch Kapor reminded the Committee, to create a national information infrastructure.

3. We are also left with ANS in control of the key network backbone and having exclusive rights to sell pure commercial access to the backbone through which the traffic of other commercial service providers must pass.

4. The playing field is still slanted on behalf of ANS because only ANS can say to any potential customer by buying a commercial attachment through us we can guarantee you that none of your traffic will inadvertently fall outside of the acceptable use guidelines

and get you into trouble with Federal authorities.

5. The field is also tilted because ANS has, for nearly two years, been paid an extra seven million dollars a year by the US government to deliver a working, fully functional T-3 backbone. This extra service was never put out for public bid. Instead it was awarded as a follow to an "agreement" granted in 1987. The payments of extra funds to ANS appear to have been made without the exercise of due diligence on the part of the NSF to ensure that the service contracted for would be delivered in a timely manner. It has taken almost two years to raise the backbone speed into the five to ten megabit-per-second range. T-3 is defined as forty five megabits-per-second. ANS is not yet delivering what it is being paid to deliver. Meanwhile, ANS's two commercial competitors PSI and Uunet get no direct Federal aid for their backbones. While ANS gets Federal aide, because of the commercial use privilege granted it by the National Science Foundation, it also can promise its customers security that its competitors cannot.

Those who are being hurt by present policy (the CIX) assert that the network technology is mature and commercially viable. They ask that government aide

to network providers cease. Those who benefit from the present policy (Merit, ANS, EDUCOM, NSF) assert that the network is not commercially viable and, as precompetitive technology, should be receiving direct government aide. The tenor of the March hearings was that Federal aide to network providers should end soon and that the NSF should be encouraged to get out a solicitation for the backbone that would open up the playing field.

With everyone waiting and the spotlight on it, the NSF appears to be incapable of getting out a solicitation for the new backbone. Last November it said the transition would take 12 to 18 months beyond the end of the current cooperative agreement on November 1, 1992. It promised to have a draft solicitation out in February. February came and went. The solicitation was promised for May. May will soon be gone. (John Sigmon said that the thinking was now that the draft solicitation would be ready toward the end of the summer! What's more he said that the House Science Committee was powerless to do anything until the solicitation was issued.)

One would think that further foot dragging on the part of the NSF might prompt the Committee to hold further

hearings as to the reason for the delay.

Instead what we have is a government agency subject to considerable criticism in its handling of a cooperative agreement acting, not to terminate the agreement, but rather to extend it for an indefinite amount of time (probably at least two years as a result of the way the way events are now unfolding).

The outcome seems to have been hard-wired into the "plan" years ago. The network having been sold to the Congress as a network for *Education* as well as Research is being implemented almost solely to serve the research community. Sigmon said that he hoped costs of usage wouldn't go up to such an extent that a few, marginal, low end users could no longer afford access to the network. If, however, this did happen, that was the price of progress and he was prepared to accept it.

One wonders if Congressman George Brown and Senator Al Gore feel the same way. If they do, they ought to say so *now* and very *publicly*. The voters with whom *someone* appears to have played a game of bait and switch, deserve to know.

## Letter to the Editor

Below is a response from Vint Cerf, one of the most senior and respected members of the Internet community. I sent Vint the Editorial from Issue One of *The Cook Report* and asked his reaction.

Gordon,

1. The present TCP/IP technology has to be evolved further before it can be considered commercially viable for large scale application.

There are the problems of growth (address space and routing capacity), security, accounting and new features (support for packet video and packet voice, multicasting, authenticity and integrity in email), etc.

For certain simple applications (e.g. private LAN interconnection) the present technology works well, but it doesn't scale to the size that the public service commercial providers expect!

Obviously, the Internet is working - but it is very stretched in important places to cope with the rapid growth. More work is needed.

2. I think your assertion that T-3 is or was non-

functional is too extreme. They had some serious engineering problems, I agree.

3. The idea of separate R&D and infrastructure procurement is interesting. How does it play out when the gigabit results are in and the telcos involved want to offer the service? How does it transition into infrastructure?

Finally, you should give some consideration to the fact that traffic on the Internet system, as measured in the NSFNET backbone, is growing exponentially. A 1.5 mb/s backbone is inadequate. A 45 mb/s backbone will become inadequate as packet video penetrates the system (and it will-workstations have audio and video boards built in these days).

Any rearrangement of the funding for ANS - provision of NSFNET needs to take into account this large demand for capacity (which will only get worse as the system grows).

Thanks for sharing these ideas with me.

Vint

### Response from the Editor

Vint, thanks for your thoughtful critique of the concerns I raised. I note your response about TCP/IP technology not yet

(Continued p. 10)

## PAC BELL Offers Knowledge Network Gateway

**Editor's Note:** As Dave Hughes has shown in his critique of the Community Learning Network, network service providers too often suffer to such an extent from a love of their technology that they assume all they have to do is build the network, open the doors and watch the people flock to its use. A case in point appears to be PAC Bell's Knowledge Network Gateway Service. Bringing a sizeable proportion of any user population into active network use requires an effort directed about 25% at establishing the technology and 75% at hand holding the end users.

On April 24, 1992 Sean Donelan wrote the following to the Com-priv mail list:

I read in the April issue of *Boardwatch* magazine that PacBell is planning on deploying something called the "Knowledge Network Gateway." The article reported that this will provide high speed access for California schools to the Internet.

What is this (assuming it isn't an April fools article)?

—  
Sean Donelan, Data Research Associates, Inc, St. Louis, MO.

### Brian Lloyd replied:

I have been involved in some of Pac Bell's dealings with IP and providing services to schools. They have leaned heavily on BARRNet and several of the UC campus networking departments (Berkeley and UC Davis come to mind). In those schools where BARRNet, Berkeley, and UC Davis have taken the lead, the project has been successful. In those places where PAC Bell has tried to do the whole thing themselves, it has been a failure.

The key problems have been lack of technical understanding on the part of the PAC Bell employees participating in the project and in a lack of support and education for the teachers and educators involved in the project. For instance, even those places where the network came up and worked properly

the project was a failure in those places where the educators were left to their own devices.

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So, just getting the network up and running is only about 30% of the solution. The other 70% is ongoing hand holding and education

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So, just getting the network up and running is only about 30% of the solution. The other 70% is ongoing hand holding and education. You need to get a critical mass of the teachers/educators trained and knowledgeable before the "let's get K-12 on the Internet" project will be a success. PAC Bell is still learning this painful lesson.

Brian Lloyd, WB6RQN  
Lloyd & Associates  
3420 Sudbury Road  
Cameron Park, CA 95682

On the Iris Teachers Network I asked two California K-12 teachers to react to the exchange Between Sean and Brian.

### REPLY from Bonnie Price 25-APR-92 2:16

Gordon, unfortunately, the numbers bear out the sad facts that it is incredibly difficult to get large masses of teachers online even in a friendly environment like the Iris Network. Perhaps it's such a verbal medium that only people who have inherently articulate modes of communication can thrive here.

Sometimes I think the problem (if it is a problem that people don't flock to this method of communication by the hundreds) is that we're assuming people *like* to write to each other. Some people don't even like to talk to each other, much less have to formulate coherent sentences. Sometimes I think it's a problem with the interface, that this seems so sterile an environment, but then I meet people who make this the most wonderful 3-D experience in their verbal vivacity that I can't imagine anyone else ever finding this dull.

In schools, you tend to have a group of people who are harassed for time and rarely have intellectual leisure (in high schools and elementary, I mean — perhaps one reason why higher ed has so many people active is that there is the expectation there that the life of the

mind, the discourse and the dialogue is of deep concern to professional growth. That's not true in a typical (old style) elementary school or most high schools. There teachers deal with people like my old superintendent whose idea of perfect staff development was to hire a well trained teacher—Good teachers are born, not made, he felt, and so he never saw a need to invest in further training. They were hired to conduct classes, deliver services. Professional growth and improvement were not part of the program.

Perhaps the fact that I'm an adjunct prof in the Education Dept. at Whittier College might explain my aberrant behavior.. I became an adjunct just as soon as I finished a master's degree in education and I took to the college level teaching like a duck to water, opening to packed classes. I suspect my success was largely due to the active intellectual nature of a practicing elementary school teacher.

I feel that a successful telecommunicator (not a downloader or system cruiser, but a contributor) is an intellectually vital person. And I suspect that our society is *not* especially intellectually vigorous at this point.

Bonnie

### REPLY from Joan Winsor 25-APR-92 5:02

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Those who think that "If we build it, they will come" is the whole answer are setting themselves up for failure. Unlike baseball, telecomputing is not something that the average person knows and understands.

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I have no direct knowledge about PAC Bells involvement, but I agree 100% with Brian's last paragraph. Those who think that "If we build it, they will come" is the whole answer are setting themselves up for failure. Unlike baseball, telecomputing is not something that the average person knows and understands. To put it another way, if, in the film "Field of Dreams," the field that they built had been a field for some completely unknown game, there would have been no film. So just building a network does not insure that people are automatically going to be able to walk

right in and start “playing” the game with no opportunity to learn the rules, or to have coaching and batting practice, etc.

In a way, getting into telecommuting is like entering a different world that uses a different vocabulary, has different social conventions and means of transportation, and those “arriving” in this new virtual world experience “culture shock” in the same way that they do when moving to, or traveling within, a foreign country. When traveling within one’s own country, one knows how to get around and what to expect; when traveling abroad things are not as people expect them to be. The same phenomenon is experienced when entering the world of telecommuting.

Joan

## **MCI & COREN** (from p. 1)

After his presentation I approached Edgerton privately and asked for more detail. He declined, saying that it was up to SURAnet to respond. To date SURANET has declined comment.

This is a strange way to market a new service. One wonders if it is a kind of safety net for MCI and the mid-levels if relations with ANS should prove to be unmanageable. At any rate the exchange offered confirmation of information shared with me by someone else in February of this year.

## **Letter** (from p. 8)

being viable for *large scale* commercial application. Apparently there is a boundary out there where at some point in our expansion we shall get into trouble because of the technical points you enumerate. This and the other problems you list is certainly not keeping commercial providers from acting as though the technology were commercially viable. Could the IETF do some calculations for the non technical folks and tell us when at current rates of growth things will break in such areas as address space etc?

As to the T-3 backbone, please see the piece in this issue. Finally, as far as building on the gigabit testbeds goes, will we be seeing some answers to the questions you ask from CNRI?

## **ANSnet Plans CIX Interconnect** (from p. 1)

4/27 Routing Plan for CIX-ANSnet Interconnection

### **A Requirements**

#### **A. 1. Symmetric RE <-> RE routing via ANSnet for NEARnet/BARRnet traffic**

Primary routes between NEARnet/BARRnet RE networks and CERFnet/PSInet RE networks should be symmetric across the T-3 network. In other words, RE <-> RE traffic exchanges between NEARnet/BARRnet <-> CERFnet/PSInet should use the direct ANSnet path in both directions.

#### **A 2. Symetric CO <-> CO routing via CIX for NEARnet/BARRnet traffic**

Primary routes between NEARnet/BARRnet CO networks and CERFnet/PSInet CO networks should be symmetric across the ANSnet/CIX interconnect. In other words, CO <-> CO traffic exchanges between NEARnet/BARRnet <-> CERFnet/PSInet should use the CIX in both directions.

#### **A 3. Traffic exchanges among direct connected CIX members should use the CIX.**

Traffic exchanges among CERFnet, PSInet, Alternet, & DNET should normally use the CIX in both directions.

#### **A 4. Minimize router configuration changes**

Required changes to existing router strategies by participating service providers should be minimized where possible.

#### **A 5. Maximize connectivity among existing service providers**

Routing information exchanges among participating service providers should be distributed in such a way that each service provider has maximum connectivity to the other providers, subject to the constraints on routing advertisements imposed by each border AUP or bilateral agreement that may apply.

#### **A 6. Avoidance of Routing Loops**

While short term loops may occur during transient periods of convergence, no stable routing loops can be tolerated.

#### **A 7. Provide Fallback Connectivity**

Fallback routing among all participating service providers should be supported in the event of a link failure.

### **C. Inter-Autonomous System Routing Exchanges**

Each participating service provider advertises reachable networks to a directly connected peer provider such that the advertisements are compliant with the acceptable use policy of the peer provider. ANS will provide a publicly accessible list of 'CO' networks that ANSnet may announce to participating service providers. To support the symmetry and connectivity requirements described in Section A, participating service providers will use this list of 'CO' networks to assist in making route selections.

Routing loops may be avoided by selective network announcements using inter-autonomous system routing protocols such as EGP2 or BGP. It is highly desirable to use BGP for all such routing exchanges since AS path selection may be used instead of selective network re-announcements to avoid routing loops, thus providing additional feedback routing options (increased redundancy). In addition, use of BGP will allow more efficient exchanges of routing information by

means of incremental updates.

## F. General Conclusions

A routing plan supporting the interconnection between the CIX and ANSnet has been proposed. It is recognized that routing plans change overtime and that this plan may change to address the evolving needs of the service providers.

This plan does not seek to optimize routing according to geographic topology.. This has not been proposed as a technical requirement and would require further analysis to support.

It is possible to require additional fallback routing options to several participating service providers if additional announcements become compliant with border service providers AUP or bi-lateral agreement, and such additional announcements can be supported without the introduction of routing loops.

## Editor's Comment

I don't pretend to understand the technical detail behind this draft routing plan. I offer it for those technical readers who may be able to extract useful insight from it. I hope that the CIX will present it's views of the situation for publication in the June issue of the COOK Report.

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# NEW Members of the Internet

## From the Editor:

Foreign connections appear to dominate the rapidly growing number of new networks. In 6 weeks the number of T-1 nets has grown from 4957 to 5360. Space permits only a tiny sample.

On 5/6/92 the following network additions were *among* those announced by MERIT

## T1 Network:

Net #	Net Name	Location
144.168	GPSEMI	GEC Plessey Semiconductors, Cheney Manor, Swindon, SN2 2QW, UNITED KINGDOM 1:200 BARRNET Regional Network
145.25	IAMPET-IPNET	Institute for Advanced Materials, NL-1755 ZG Petten, NETHERLANDS 1:590 EASInet Regional Network
149.248	TA-NET	TA Triumph-Adler AG, Fuerther Str. 212, Abt. EF, D-W-8500 Nuernberg 80, GERMANY 1:701 Alternet 2:1238 ICM-NORDUNET
158.122	CETYS-NET	CETYS - Centro de Ensenanza Tecnica Y Superior, ATT'N Jorge Gomez, P.O. Box 2808, Calexico, CA 92231 USA 1:195 SDSC Regional Network
192.131.80	PEXIC	PEX Interoperability Center c/o Convex Computer Corporation, 3000 Waterview Parkway, P.O. Box 833851, Richardson, Texas, 75083-3851, USA 1:114 SESQUINET Regional Network
141.72	BA-MA	Deutsches Forschungsnetz, Pariser Str. 44 D-1000, Berlin 15, GERMANY 1:1324 ANS New York City - DNSS 35

## CLN (from p. 6)

how massive a job it is going to be to do that re-training, and re-education, even of the trainers and teachers. The time it will take to educate teachers in the mastery, and effective use, of advanced equipment in the Center, will be considerable, indeed. So using the Centers to 'teach teachers' more than students, might make a lot of sense. In this case the numbers are much smaller.

When I visited Lt. Col. Carey, he was especially interested in my use of NAPLPS based telecommunicated graphics and foreign language fonts over ordinary telephone circuits with ordinary modems and computers common to schools, for the teaching of art, language, and the math and physics of Chaos from MIT to rural western US areas. He remarked 'That could fill a gap in the technologies we are considering.' As indeed it could. For, unless full motion, high definition, high bandwidth communications and display technologies are absolutely necessary in the future educational context, ISDN, 9.6 error correcting modems, VGA MSDOS and color MacIntosh machines running smart - and usually free - software, with NAPLPS for some graphics, and lots of language, math symbology fonts - the vast majority of tomorrow's subjects can be taught with today's equipment.

For rather than presenting just a leap into a new 'classroom' concept, it seems that the future really is far more decentralized - or 'distributed' than that. And the need for high end displays and bandwidth is less than we want to admit. If a community center can act as a teleport, be a gateway to the rest of the world, internally translating data arriving both ways into the formats and protocols necessary to be accessed from schools, homes, and offices, and be an educational 'distribution' point, and not just an 'end of the pipe' place, it seems as if the Community Learning Network concept could be massaged into an interesting model for America.

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