

Simon Holland of the Commission for the hospitality.

UPDATES

North American (NA) Updates

Peter Ford from Los Alamos National Laboratory on loan to the National Science Foundation reported on the status of the NSFnet solicitation. A substantial number of proposals were received; panels are now being setup to review the proposals. "It would be nice to get an award made by the end of the year. This is a target we've set in our minds." George Strawn has gone back to Iowa State, but is still part-time. Priscilla Huston of Rice University is the new NSFnet Program Director. "There is no doubt we will see significant change in the network in the U.S." It will be more competitive and providers will be more global. Glenn Ricart asked about international connectivity and transit traffic after April 1994. Peter Ford replied that ANS will not be turning off its network in April, and "the NSF will work very hard to make sure international connectivity will be maintained." Kees Negggers noted that everything the NSF has done has been very open, but that the rest of the world doesn't really understand the consequences. The engineers are only beginning this discussion this beginning today, but until the awards are made, it isn't clear with whom negotiations should be conducted. Steve Goldstein said that "International connections made at the level of the NSFnet backbone will be able to get to their intended places. Those made at that level will be taken care of. This applies specifically to the GIX and the West Coast. For example, the GIX may be bridged to the West Coast. ... The International Connections Manager agreement with Sprint has 2.5 years to run." Kees observed that Europe no longer has a body with which to negotiate connectivity improvements. He asked if NSF would be willing to act as that body. Peter Ford replied that NSFnet is attempting to set up a structure that will work both domestically and internationally.

Bill Bostwick announced Nico Habermann died of a heart attack two weeks ago; he was chair of the Federal Networking Council.

The ATM service for DoE and NASA Science Internet is "very very near resolution" and will bring in the 45 Mb/s part of the Internet.

Steve Goldstein announced that Peru signed a contract with PamAm Sat during iNET93. Bolivia is very close. Columbia sent the head of their NSFnet equivalent to iNET and we expect that Columbia will be on within the next 3-6 months. Venezuela is already connected, but they may re-connect via PamAmSat in Homestead. Argentina is presently disconnected due to their local telephone company. Another group in Argentina may create a second link. Several countries in Central America may form a star around Costa Rica. Honduras may get its own connection to Homestead in addition to connecting to Costa Rica. Costa Rica will divide into three subdomains for government, education, and commercial (RACSA).

The CANARIE project is now officially named CANARIE. It has received government funding; the agreements to disburse the funding should be completed in the next few weeks. There should be T1 links across Canada within a year.

Glenn Ricart announced that 7 U.S. regional networks have formed an organization called CoREN--Corporation for Regional and

Enterprise Networking. They will create their own inter-regional connectivity and will be doing an ATM test network in the next few months. A production timetable depends upon the results of the NSFnet solicitation. The regionals forming CoREN are: SURAnet (southeastern US), NEARNET (northeastern US), NYSErnet (New York), SESQUINET (Texas), MIDnet (middle US), CICnet (Great Lakes states), BARRNET (California), and Northwestnet (northwestern US).

Peter Kirstein asked if the carrier-based experiment in international ATM interconnection (34 Mb/s) (TINA) was working with the U.S. internet. No one knew of such cooperations, but the question will be re-raised when the IEPG is present tomorrow.

European (Euro) Updates

Kees Neggers reported that RARE and RIPE are very stable. The RIPE NCC is doing very well.

Enzo Valente reported on the HEPnet consortium connecting the high energy physics laboratories in Europe and Russia and the United States ESnet. Plans are to upgrade the lines to follow the needs.

An operational unit has been set up under the name "Dante." Howard Davies is one of the two joint general managers; the director is Tomaz Kalin. Davies told us the relationships between the projects. The EBONE now serves as both the existing interconnect backbone in Europe and also the transcontinental collector/distributor in Europe. About half the EBONE traffic is destined for the U.S. and Asia-Pacific. It will continue for this purpose. European traffic will often be transitioned to EMPB. The EMPB (European multiprotocol backbone) provides both X.25 and IP at up to 2 Mb/s. The X.25 service has been in place since October 1992. The IP service passed its pilot service test in June 1993 and is presently in operation. There is a contract in place between Unisource (Dutch and Swedish PTTs) with RARE (to be assigned to Dante). The contract defines function and performance and provides guarantees. The term "Europanet" is to be the term for the complete network service Dante will provide including EMPB. Work is underway to see how EMPB can replace EBONE for the intra-European traffic. If use of EMPB becomes dominant, a transition of international links from EBONE to EMPB will be contemplated.

EBONE is planning next year's operations. Dante is a member of the EBONE group and provides a gateway to EMPB. There are some countries not planning to use Dante and EMPB. Christian Michau noted that some of these countries want to extend EBONE at least until Europanet has proved itself; others such as France want to see EBONE continued for the long term. More planning will be done at the September meeting of the EBONE group. EBONE is willing to maintain competition with EMPB. Kees Neggers noted that those wishing to coordinate with Europe will have to work with both Dante and a new consortium of 6-7 countries intending to continue with EBONE including France (RENATER).

Simon Holland expressed concern with the split and urged a single organizational point of European contact. Sven Tafvelin noted that getting the European cost structure changed to encourage a unified network should be a high priority of the Commission. Howard Davies expressed Dante's long-term ambition to win the support of all Europe to represent them internationally.

Dante is currently leasing a virtual private network from Unisource. Later, PTTs may provide other virtual private networking options that Dante may choose to utilize according to Peter Kirstein.

Steve Goldstein wished noted for the record that "what NSF has done [in restructuring US connectivity] has not been done any more unilaterally than what Europe has done [in considering changing the infrastructure]." Kees Neggers wished to object noting that the U.S. process has accepted some architectural principles that, as the process continues, may limit the possible outcomes. In Europe, the discussion is just starting, and the CCIRN and all others are invited to provide their input; no commitments to a process or conclusion have yet been taken. Kees Neggers does not question the NSF's intent to improve the U.S. networking situation; he is simply concerned about the possible outcomes that may follow from their procedure. Howard Davies noted that the European changes have not affected US connectivity at all, while the US changes have substantial consequences for Europe.

Another important development in Europe is that the COSINE Project has been concluded after three years. Dante is now setup to provide services. There is no successor for the policy group. The Commission with Norway and Switzerland has tabled a new Eureka project called EuroCAIRN to setup a high capacity infrastructure including gigabit networking. There is also potential participation by Hungary, Solvenia, and Russia. The next meeting on EuroCAIRN is September 7. Firm expressions of interest have been received from all eligible members except Ireland. It will promote 34 Mb/s within Europe and extend its interest beyond connectivity into applications.

On the 24th of May, the Hilog met. This is the High Level Officials Group intended to set high level policy for European networking. It is as yet unclear to whom Hilog will permanently report.

Another new development is that NATO is interested in providing support for networking in central and eastern Europe. The support is via RARE; the first visible action will be meetings in Budapest in October and next summer in Moscow. The person responsible in NATO was previously responsible for Commission activity in COSINE.

Simon Holland announced changes in Commission DG13. The whole ESPRIT project has been moved to the industry director general. That leaves DG13 focus on telecommunications and networking and support for EuroCAIRN

Bill Bostwick asked for continuing updates on TINA. Peter Kirstein took an action to find the right person.

Asian-Pacific (AP)

Kilnam Chon gave the AP update. Fifty to sixty people participated in an APCCIRN meeting following iNET. An experiment to form a counterpart of the Internic and RIPE NCC coordinated in Asia-Pacific (APNIC) is going to last until next spring. At that time, a decision on its future should be made. The main function is assigning domain names and network numbers. They will also start a routing registry soon.

Kilnam Chon noted the need of discussion between Asia and Europe

on issues such as link coordination between them as most of the transit traffic over the USA is the transit traffic between Asia and Europe. The APCCIRN decided to include the commercial service providers. At the next meeting in December, the 8-10 commercial companies in AP will be asked to make presentations.

Another important issue in AP is local language support.

Curtis Hardyck discussed the Pacific Neighborhood Consortium. It consists of universities, national libraries, and some education ministries. It was started by the presidents of 17 institutions meeting in Seoul two years ago. Since then, it has grown to 40 institutions in 16 countries. The goal is to develop a database of machine-readable databases. The next meeting is January 17-18 in Hong Kong and will discuss how the databases can be made available on the Internet if there are no restrictions on use, or at least available to PNC members if there are restrictions on use. The PNC is member-supported and contributes the resources of its library and computing people. Hardyck can provide a brochure to those interested.

Guam, Macau, and Vietnam are being connected to the Internet. The Phillipines and Indonesia are getting connections via the World Bank and UN Development Program. The AP region has 80% of the developing countries, but only 10% of the attendees at the iNET developing countries workshop were from AP.

APCCIRN covers the countries from the Pacific to India and Pakistan now. Countries in central Asia and the Middle East are not covered by either APCCIRN nor EuroCCIRN at this moment. We need to cover these countries as many of them are not networked.

IAB Updates

Barry Leiner provided an update on iNET93 which was attended by 860 people from 91 different countries. The iNET Workshop for Developing Countries had 126 attendees from 66 countries. iNET94 will be in Prague (inet-jenc-request@rare.nl) June 13-17, 1994 jointly with JENC5. ISOC is attempting to acquire a class "A" relationship with the International Standards Organization (ISO).

NSF has made a small grant to VITA to videotape sessions at the iNET workshop. If something comes out of this, training videos would be made available to the community at large. Non-exclusive rights were given to ISOC.

ISOC Updates

Tomaz Kalin, who is a board member of ISOC, reported on its status. ISOC will begin supporting the IETF this year with \$300,000. iNET95 may be in Singapore. Only one of the six elected board members came from outside the United States; this is an issue of concern. Regional elections are being discussed. An Executive Director is being sought. A contract for the Secretariat is to be negotiated with CNRI.

There are still some discussions about whether the IESG is part of ISOC. ISOC is discussing liability issues it may acquire.

International Cooperation Board (ICB) Updates

The last meeting of the ICB discussed privacy-enhanced mail and workstation conferencing among the members, but did not raise new policy issues.

COMMERCIAL / GENERAL SERVICE PROVIDERS (evolved into: ROLE OF THE CCIRN)

[To skip the discussion and go to the summary conclusion, look for the last paragraph in this heading.]

In Brussels, the discussion focused on the formation on the CCIRN by the research and education communities and the need to retain this focus. Barry Leiner remembered the purpose of the CCIRN decided in Brussels was to serve the research and education community. The core membership in the CCIRN was to be those people whose job was to provide network resources to the research community. Clearly, the U.S. National Science Foundation and RARE are among them.

Peter Kirstein observed that India and the Arab countries have chosen to be connected via commercial carriers and have therefore opted out of CCIRN. [Comments from Kilnam Chon indicate that this statement needs to be verified as it is contrary to what the APCCIRN believes to be true.]

Simon Holland believes there is a need for a research/education community networking coordination body worldwide whether or not it relates to the Internet.

Kees Neggers agreed that the CCIRN should not be limited to a single protocol stack.

At the ISOC board meeting, there was discussion about whether the ISOC should form an International Operations Board (IOB) or sponsor a meeting of the likely players. Neither of these happened.

Barry Leiner suggested the primary role of the CCIRN is to provide a communications vehicle for fostering international coordination. In his view it should not be a policy body per se.

Simon Holland suggested that if international policies are not in place, it will be very confusing for all players. Bill Bostwick noted the CCIRN has been successful in helping international groups share policies with one another.

Greg Chartrand sees a large coordination role for science users of commercial networks.

Barry Leiner provided a three part justification for the uniqueness of research and education networking. (1) Needs often outstrip commercial availability (2) Free networking is often needed to stimulate interdisciplinary and intercontinental cooperation (3) Networking researchers need testbeds.

Glenn Ricart noted that coordination of ISO level 2 links is no longer needed within the research and education community alone because of the growth of the commercial networks. The IEPG may continue to work in this area (Greg Chartrand). The CCIRN could evolve either toward inclusiveness in level 2 routing and involve commercial vendors, or "move up the protocol stack" and work on research/education issues at closer to the application layer. In Brussels, we seemed to choose the later approach.

Steve Goldstein recommended that Barry Leiner and Simon Holland review the CCIRN Terms of Reference in terms of their excellent comments. They agreed.

Kilnam Chon and Barry Leiner had a discussion agreeing that networks that serve education and research will also carry commercial traffic, but that the CCIRN focus is on the research and education users. Bill Bostwick reminded us we don't really represent the users, but on their support structure.

James Hutton suggested we should consider passing all lower level issues down to IEPG and all higher level issues up to an international version of Hilog. CCIRN tries to progress the issues of the research community without referring them to cumbersome government resolution mechanisms.

[Summary of the discussion:]

Barry Leiner stated the summary for the group. "The CCIRN is about coordinating the provision of networking service to the education and research community. The CCIRN has formed the IEPG for the purpose of coordinating the engineering aspects of that coordination mission. The CCIRN recognizes that coordinating global engineering requires the participation of the broader community providing services to the research community including commercial network providers. The CCIRN needs to be concerned with management and policy issues revolving around the provision of service to the education and research community." Simon Holland and Barry Leiner took an action to write a small paper discussing the subtlety of these points.

FUNDING THE GLOBAL OPERATIONS OF THE NIC

[Monday discussion]

Many members of the CCIRN are concerned that the root of the number assignment space is presently concentrated in a single country's government (the United States).

Steve Goldstein promised that no action will be taken without full consultation of the international community, and that delgate registries should be employed.

Barry Leiner suggested the best solution to this issue may be to ignore it because the root has little or no power if there is strong delegation.

Rob Blokzijl emphasized the need for well-defined international policies. He believes the best solution is for a true global NIC. Tomaz Kalin agreed that there must be an international root, even if its cost is very small.

Kees Neggars believes that the growth of IP in Europe will be greatly retarded if the IP version 4 address space is not put under the control of an international group/party. Barry Leiner believes that however desirable this is, there is no experience in operating any global root service.

Bill Bostwick stated his personal opinion that the U.S. Government does not want to give up control over the IP networking space.

Rob Blockzijl said that it is painful to see how the APNIC and RIPE NCC NIC are avoiding the issuance of class "B" network numbers in accord with international agreement, while the U.S. regional NIC (which also happens to be the top-level NIC) doesn't follow these rules and is issuing class "B" numbers without

commensurate restraint. Without a separate root, there is no one to whom to take these concerns.

Kees Neggers asks all CCIRN members to go home and ask their government to internationalize the control of IP so that we have an open IP networking environment. This includes number assignment and the IETF. If any government disagrees, they should bring back that disagreement and it will be discussed.

Kilnam Chon agrees and suggests a position paper be drawn up to this end.

Steve Goldstein and Bill Bostwick agreed that the issue is larger than the CCIRN; it involves the general provider community.

[Tuesday discussion]

Glenn Ricart opined that the policy issues which still need resolution are globalizing the root of number space and setting policy and organization of the GIXes. Kees Neggers reported that IEPG recommended handling the root issue by globalizing the IANA (Internet Assigned Number Authority); he is pleased with that direction.

Tomaz Kalin stated that "we want a symmetrical hierarchical structure with a top level number authority (perhaps IANA), and a series of regional NICs (currently 3) which will finance the IANA." He was asked by co-chair Bostwick and agreed to produce a proposal for discussion purposes and coordinate it with the IEPG.

JOINT MEETING WITH IEPG

[Steve Wolff of the NSF joined the CCIRN meeting.]

REQUIREMENTS

(Guy Almes excused himself.)

Greg Chartrand explained the requirements for DOE and NASA to China and Russia. The three regions of interest in Russia are the Moscow area, St. Petersburg, and Novosibirsk. The top priority is Novosibirsk. DOE is putting in a link to St. Petersburg to address the fusion and high energy requirements.

The Russian plan is through the DOE and is being studied by the Dept. of Commerce. The China plan should be finished by the DOE this month.

There is a DOE High Energy Physics link between SLAC (Stanford Linear Accelerator) and IHEP/Beijing. ESnet is not routed to the link at present, but the China plan will address this.

Co-chair Bostwick asked if the Russian plan could be distributed outside DOE. Greg agreed to take an action to see if it were available and to send it to Bill Bostwick.

In response to a question about routing for the Russian links, Greg replied that DOE has been told by Commerce that they can route traffic delivered by a link someone else has installed.

Rob Blokzijl explained that there are three commercial providers in Russia. All institutions, including non-profits like the Kurchatov Institute, use these commercial services.

Steve Goldstein explained that NSF's goal was infrastructure growth. The (privately financed) International Science Foundation (ISF) has been active. There is a direct 64 Kb/s link since first of June from Sprint Networks in Moscow and the ICMnet router connected to the GIX. The Sprint Networks operation is joint between Sprint and the Moscow telegraph company. There is a Cisco router in Moscow with 12 synchronous ports and a terminal server. GLASnet is already connected to the terminal server. SOVAM will come up soon; they also have their own link to San Francisco. Other sources in Moscow have ordered dedicated (19.2 kbps analog) links to the router. The NSFnet backbone has been unable so far to pass Russia and China, but the GIX and CIX announce this traffic to the commercial networks. ISF also plans to assist with connections from Novosibirsk and with infrastructure in Novosibirsk, St. Petersburg and a national backbone for Russia. Also, with Internet demonstration and development projects in Ukraine, Belarus and other states formerly in the Soviet sphere.

In addition, the ISF has agreed to fund a satellite link at 64 Kb/s from the Russian Academy of Sciences to the High Energy Physics Institute in Helsinki. It will be available for general infrastructure. The rates are favorable because the satellite is turned off at night to save batteries.

ISF and RELARN has agreed to help fund the lion's share of a Russian-built fiber optic backbone in the phone company conduits from Kurchatov Institute of Atomic Energy, through Moscow and the Russian Academy of Science Presidium Building, through the Sprint Building, IKI (Institute of Space Research) which will have the NASA and DOE link, and the M9 switch. The installation will be done by ROTEC(?) by the end of October and may be in operation as early as the first part of next year with 15 institutions.

In Novosibirsk, a group had generated 80% of the financing for a link to Sweden. ISF will provide the other 20% and it will be installed by October.

The St. Petersburg Ioffe Institute has a proposal into ISF for local loop funding to match up to the DOE link to Moscow.

ISF is helping Russia look at a national backbone.

In Ukraine, a small program is looking at PC based routers. The ISF sponsored 21 people to the developing countries workshop.

ISF/NSF has been contacted by a group from Belarus to connect to Minsk.

The Turks who have a link to the GIX will extend service to Azerbaidzhan.

There is also a proposal from Georgia, but they don't have power all day.

Estonia has three or four links out that ought to be consolidated; Mats Brunel is taking the lead to help there. DFN is helping with a link into Latvia. ISF will help Lithuania out with workstations to be used as network servers. In Latvia, Riga has problems with local wiring and may need radio modems to gain connectivity.

Milo Medin reported NASA is seeking a general export license for Internet data. NASA is trying to pull a 256 Kb/s leased line into

IKI and then route it without any restrictions with the export license.

(Guy Almes returned.)

IEPG REPORT

IEPG Co-Chair Geoff Huston gave the IEPG report. As reported at the last IEPG, it is no longer feasible to coordinate individual links. The emphasis is on creating structures that will scale the routing problem. The route server experiments at MAE-East are being watched closely.

The registry function is an integral component of policy integrity and the major support vehicle for external routing. IEPG suggests wider dissemination of the role of the registry function within the provider environment.

Peter Ford raised the problem that some commercial providers shield the identity of clients; this makes it difficult to solve end-to-end problems or seek out the perpetrators of security attacks.

Geoff Huston said we're already to the stage where network providers must either decide to run CIDR or point default outside their network. Providers must have registry information and CIDR tools.

Peter Lothberg said that today's routers have a limit of about 60,000 paths. A path is a way to get to a network. Steve Goldstein reported that 15,000 networks are now routed. Peter Ford said the growth under CIDR should stay under the growth rate for memory and router capability. BGP4 needs additional memory, and turning on BGP4 requires additional memory in many routers.

Guy Almes reported that ANS expects to do BGP4 and CIDR with aggregation by October on the ANSnet T3 that supports the NSFnet backbone.

Geoff Huston reported that the MBONE has grown to more than 500 sites. Milo Medin told the group that Sun is coming out with a 30 frame per second MPEG board that has chewed up the LANs at Sun. Everyone should be aware that additional bandwidth, routing tools, and limited resources will result from widespread use of video.

Geoff continued that registry support is required for CLNP coordination. There are NSAP issues including the breakup of country NSAP prefixes. Static tables will have to be replaced with dynamic routing tables.

The CIDR issues are (a) existing registry roles are not operating consistently with CIDR guidelines. It will be expensive to deaggregate CIDR routes if allocation is not done carefully. Effective use of CIDR will require reclamation and renumbering of the existing old growth forest of numbers.

The IEPG does not intend to devise and enforce rules for service providers, but does intend to continue work on a document describing the roles that should be fulfilled by service providers. Barry Leiner suggested the document would, like the host requirements document and the router requirement document, list the functions that should be provided by the service provider. Daniel Karrenberg said he has started a document

describing current practices that should be extended.

Geoff Huston reported that the IEPG is already functioning as an internet operations activity in the context of the entire internet. It should operate in its own right, not under the CCIRN. There is much that would have to be set up quickly, but there is a consensus position to move toward a role in the Internet as a whole. The CCIRN can still send work requests to IEPG that will be treated seriously.

Barry Leiner gave the CCIRN position. The CCIRN created the IEPG because it was needed, and the CCIRN is pleased with the results. Furthermore, the CCIRN recognizes that the provision of networking service to the research community comes from service providers who have broader objectives. In some sense, this is why the IEPG was created as a separate organization and encouraged to invite commercial activities. Barry further suggested the ISOC might either be a home or help find a home for the IEPG.

Steve Goldstein wished the IEPG well and suggested they create their own parent organization. Milo Medin suggested the IEPG should be an ad hoc organization without a parent; alternatively, if left under the CCIRN, it wouldn't be bad because the CCIRN has largely left the IEPG alone.

Steve Wolff noted that the IEPG has always listened to voices beyond the CCIRN, so what's new? James Hutton added that the CCIRN will always be a parent in the sense it created the IEPG, and that IEPG is welcome to live in a room in the CCIRN's house as long as it is convenient to do so. But everyone recognizes the IEPG is an independent group that can talk to those whom it wishes. Hans-Werner Braun said the problem is that there is a perception that the CCIRN provided controls and limits to the IEPG; the divorce aids with the perception issue.

Bill Bostwick said the issue is not perception, but reality. If IEPG will continue, it needs funding and support. The CCIRN is willing to support it in this way even while the IEPG has far wider contacts and responsibilities than a connection with the CCIRN would suggest.

Barry Leiner suggested getting a charter from the CCIRN but operating globally. Peter Lothberg said there are others who should participate in the IEPG but can't because their parents don't like the religion of IEPG's CCIRN parent. Guy Almes appreciates the collegiality between the CCIRN and IEPG. At the policy level, he urges the CCIRN to take on important policy issues.

Geoff concluded by asking for support for time for productive navel gazing about where the IEPG fits in.

[The discussion continued with the CCIRN alone plus Steve Wolff and Milo Medin.]

Considerable discussion ensued that if IEPG wants more than voluntary compliance, it will have to have a strong parent. Milo Medin noted that this issue is taking time and attention away from important issues and that the current arrangement isn't broken; neither is the 'breakaway' feeling universal among IEPG members.

Steve Wolff said the power of ideas is what empowers the IEPG. When policy issues arise, they will take those issues to their

managers. There needs to be a forum then of their managers to work out these policy issues. The CCIRN should be a forum for their managers.

Barry Leiner noted that while the CCIRN may not be the suitable home for the IEPG, the IEPG should weigh heavily the value of having a home organization.

Sven Tafvelin is of the opinion that ISOC is the only international organization suitable for operational issues.

The group agreed on the following summary statement: "The IEPG was formed under the auspices of the CCIRN to provide global engineering coordination. The CCIRN wishes the IEPG to continue to operate independently to make the global internet work. The CCIRN wishes to continue to liaison with them on policy issues."

CCIRN MEETING

CCIRN ORGANIZATION AND ISSUES TO BE PROGRESSED

Bill Bostwick announced this would be his last meeting, and that he'd make a recommendation to the Federal Networking Council about the future of the CCIRN at its September meeting. Bill will be moving on to other endeavors.

Barry Leiner raised the issue of whether a single chair would be better than the present three regional co-chairs. Kees Neggers noted that there is effectively a single chair based on the location of the upcoming meeting. James Hutton suggested the co-chairs act as an executive committee between meetings.

There was some consternation expressed about the progress made by the CCIRN between meetings.

Kees Neggers made the point that there is a great deal of operational coordination that happens informally because the CCIRN meetings are held. He noted that detractors don't have operational roles and don't understand the value of the meeting to operational people.

GIX

[Monday discussion]

Kilnam Chon asked for a second GIX on the west coast of the United States.

Glenn Ricart explained two kinds of GIX interconnects: (a) those where all networks connect to all GIXes (like the FIX, CIX, and NSFnet NAPs), and (b) those where the GIXes are connected to each other. In the second case, there is a political problem of deciding what organization provides the inter-GIX connectivity, its bandwidth, its funding, and its operation. These issues are avoided in the first case.

Rob Blokzijl explained two roles of the GIX: (1) exchanging packets and (2) exchanging routing information. Therefore, some networks may choose to have a 9.6 Kb/s line to the GIX just to exchange routing information.

[Tuesday discussion]

James Hutton proposed the CCIRN set a requirement or mandate that there be multiple distributed GIXes. Bill Bostwick repeated that the CCIRN has asked the IEPG for a multiple GIX solution. However, the group is of divided opinion as to whether a report of single GIX is acceptable or not. The two remaining co-chairs will liaise with the IEPG on their position on multiple GIXes. There was a consensus that the CCIRN requests a global architecture that supports more than one GIX. The co-chairs will liaise with IEPG.

Geoff Huston was asked to join the meeting to discuss GIX. A summary of his report follows and it was accepted by the CCIRN.

The GIX solves a routing problem by allowing both bilateral exchange of routes and also communication with a route server. The architecture can be extended to have several such environments. The relative locations and policies of network identifiers are traded across that structure. It doesn't necessarily pass traffic. The preference is that the GIX is the first resort of addressing and the last resort of traffic flow. To extend to multiple locations, what is going on is synchronizing the exchange of routing information. To solve this, one can use a level 2 bridge across two such points and simply trade BGP over the connections. This is viable if traffic is not passed. Engineering solutions are being proposed to synchronize address and policy knowledge across a number of sites.

There is a traffic handling problem that remains. The west coast structures have a diversity of adopted structures. Transit in a post-NSFnet world is problematical, and IEPG is looking toward how a well-architected west coast structure could work in May 1994. Geoff responded that one solution is to purchase a portion of the Washington MFS Ethernet onto the west coast at level 2.

Therefore, additional GIX points can be created for enough dollars. Milo Medin asked for clarification, and Bill Bostwick led a consensus statement that "the CCIRN will deal with transit traffic as a policy issue as it arises and will also deal with it if the IEPG tells the CCIRN there is an issue."

THANK YOUs

Kees Neggers led a round of applause for Bill Bostwick's kicking off the CCIRN. Barry Leiner is also thanked for the preparation of the logistics. He apologized for the previous night being so cold and windy.

MEETING FREQUENCY AND NEXT MEETING

It was agreed that the baseline meeting frequency will be once per year with additional meetings called as determined by the co-chairs as needed by the workload. Adjacency to iNET is viewed as desirable by the majority of members. A minority expressed an interest to have the meeting adjacent with other networking meetings such as IETF.

The next meeting is tentatively set for June 20-21, 1994 with location to be set by the European chair.

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 CCIRN Statement on IEPG Relationship

As the recording secretary for the CCIRN at the Bodega Bay meeting, I was asked to communicate to the IEPG co-chairs the following statement by the CCIRN regarding relationships with the IEPG. Glenn Ricart

"The IEPG was formed under the auspices of the CCIRN to provide global engineering coordination. The CCIRN wishes the IEPG to continue to operate independently to make the global internet work. The CCIRN wishes to continue to liaison with them on policy issues."