Minutes of the July 12-13, 1988 Internet Activities Board Meeting Sante Fe, New Mexico

1 Introduction

The July 12-13 meeting of the IAB took place in Sante Fe, New Mexico. Those attending were Bill Bostwick of DOE, Bob Braden of ISI, Vint Cerf of NRI, Dave Clark of MIT, Doug Comer of Purdue, Mike Corrigan of DCA, Deborah Estrin of USC, Phil Gross of Mitre, Keith Lantz of Olivetti, Barry Leiner of RIACS, Dan Lynch of ACE, Dave Mills of UDel, Jon Postel of ISI and Steve Wolff of NSF. Steve Hotz of USC and Thomas Narten of Purdue were in attendance serving as secretaries for the meeting. Notably absent were representatives from DARPA, and Steve Kent of BBN. Dave Clark chaired the meeting, which was officially convened at 9 AM.

2 Agenda

The first official order of business was the presentation of the agenda and its subsequent revision.

The agenda was as follows (additions marked by a '*'):

- Local Arrangements
- Reports
  - Task Forces
  - FRICC
  - CCIRN
  - Workshop (Leiner)
  - DSAB
  - DMS (Defense Message System)
  - ARPANET
  - NSFnet
- Old Business
  - Net Management (host vs. gateway)
  - Lee Labarre @ ANSI
  - Mitre R&D planning
- New/Old Task Forces
- Funding IAB & IETF
- IAB and Sunshine Law
- Naming and Directory Service

- Interoperability
  - ISODE/X.400/CLNS
- Teleconferencing Options
- Document Series
- LANL Presentations
- User Services *
- High Bandwidth Networking *
- Berkeley *
- Private E-mail *
- Next Meeting

Barry Leiner started by requesting time for discussion on user services and for a report on the high bandwidth project. Bob Braden requested discussion on the "Berkeley problem", but it was pointed out there was little point in discussing the issue without DARPA's presence. Vint Cerf requested that privacy in e-mail be added to the agenda and Dave Mills requested a status report on offloading ARPANET trunks to Wideband, another topic requiring DARPA's presence. Finally, with Dave Clark proclaiming his official "mood for the day" as "up on networking, down on the IAB", the meeting began.

3 DSAB report

Little interest was generated by release 2 of Mach. This raised the question of Mach's future. Comer pointed out that Mach has not been embraced by the research community because its technology is still heavily based on Berkeley UNIX, and an AT&T license is still required to get sources. There are presently few advantages in using Mach.

Although conceding that the release 2 distribution had been poorly handled, Lantz countered that Mach is getting substantial vendor support and that Rick Rashid has 6 full time staff members at CMU dedicated to the project and 6 more as of June. An alpha version of release 3 is due out in September, with a general release scheduled for March of 89. Release 3 will be kernelized, and no AT&T license will be required. Mt Xinu will handle the distribution, which will include Andrew and Camelot.

Given past history of unfulfilled promises, scepticism accompanied a concern that the "Berkeley problem" might arise. Kernelization has proceeded with no outside input, and no Mach players are participating in task force meetings. The consensus was that this issue could only be taken up by DARPA (who wasn't present).

Cerf asked what the IAB needed to do reguarding Mach. It is important that they do not distribute bad TCP/IP code; IAB should push Jacobsen's work. Braden agreed to pursue contacts through the end-to-end TF.

ACTION ITEM: IAB should make certain that bad TCP/IP code is not distributed with Mach. End-to-End TF to contact Eric Cooper to find out the status of Mach and investigate input channels. (Braden and/or Jacobsen)

Leiner asked if the DSAB was fundamentally disfunctional. Comer pointed out that, unlike IAB, there were no funding participants in DSAB. Leiner agreed that the DSAB was non-agency centric, and raised the question about the relationship between IAB and DSAB. Comer was asked to present a list of DSAB's working groups.

- Naming and Addressing (Peterson)
- User Interfaces (Lantz)
- Kernel (Rashid)
- Performance (Spector)
- Security
- File Systems
- Reliability (Spector) - transaction processing, National File System
- Telecommunications (Cheriton) (defunct??)

Comer mentioned that many of these groups were non-functional. It was also brought up that DSAB activities were not appearing in the Internet monthly report. Nothing was resolved before discussion was tabled by Clark.

ACTION ITEM: DSAB activities should appear in the Internet Monthly Report. (Comer)

4 Inter-Organizational Research Internet Workshop (Barry Leiner)

Leiner held the workshop June 22-24. Discussion centered around agencies sharing links, and how a link's bandwidth could be allocated to satisfy resource commitments for agencies and applications.

As a driver for the workshop, FRICC presented a report detailing policy issues. Steve Wolff passed out minutes of the working group Less-Than-Zero "WG $<$ 0", which for the first time specified network usage policies of various federal agencies. After discussion of the FRICC report, three working groups were formed and met for discussion:

1. Policy Routing, chaired by Dave Clark
2. Access Control, chaired by Steve Kent
3. End-to-End Issues, chaired by Dennis Branstad

Each working group will prepare a report by the end of July. Reports will be refined to layout specific issues and working items to be discussed at a second workshop scheduled for November 8-10 in Boston. It is hoped that the second workshop will not be needed.

Clark brought up several issues/questions that had been discussed at the workshop. Among them: supporting certain types of service, non-interference constraints, resource commitments and constraints, and accounting level-of-assurance requirements. The question of whether policy concerns are a global issue or a local issue, and the relationship between the two was raised. Another question is what type of granularity is needed. Can resources be allocated without tying them to individual packets? Do GSA regulations require we account for every packet? Is the coloring of individual packets required? This prompted a reiteration of the Boesch conjecture: If we really care about accounting, we use virtual circuits.

Cerf asked about what resources will be available to be shared/allocated, and pointed out that it seemed the set of resources to manage is small. Leiner said he'd pull together a report with this information.

Clark pointed out two significant areas for work. He suggested that in the presence of 1) policy/accounting/access issues and 2) high speed networking, our underlying assumptions and models may need to be rethought. Leiner noted that user services was another area that required fundamental rethinking. Clark noted that a spectrum of solutions (and their economic/functionality trade-offs) should be articulated to the FRICC.

At this point, Lantz asked about the DARPA folks and who was responsible for networking issues. Clark took a moment to discuss Boesch, Pullen, and Ira Richer.

5 Autonomous Networks Task Force (Estrin)

Estrin reported on her TF's 3-way video conference. Until recently, the TF had been hindered by the lack of a policy statement defining what policies they would have to enforce. The policy descriptions produced by Leiner's workshop were a starting point, and provided a context in which to work. Initially, they concentrated on three major areas:

1. Examine and clearly articulate the policy statements provided by the Leiner workshop. Work with the FRICC to clarify.
2. Examine and evaluate proposed mechanisms. Develop a criteria for evaluating different mechanisms.
3. Develop a common vocabulary/framework for articulating policy statements and mechanisms. Provide example scenarios for understanding the terms.

Estrin mentioned several general issues that were raised at the meeting:

- What granularity of control and verification is needed?
- What assumptions can be made about what the network will look like in the future? Will there be a few or thousands of long-haul nets.
- What are the breakpoints for validity requirements? Can credentials be asserted first, but verified later? How much assurance is needed that credentials are valid? Must packet headers be certifiable and will they be bound to data?

- What are the limits that can be put on global effects/implications?

Examining the policy statements from the Leiner workshop generated reams of questions. The TF concluded that the policies were ambiguous and needed further clarification. For instance, interconnect and usage policies are different, and transit is not the same as interconnect. Also, a clear statement is needed of how one determines/defines membership in a group, and what is to be done about multiple group membership. The output of this exercise was a list of such questions to bring to the FRICC to be clarified. Also, other groups such as ANSI and NBS are to be contacted to find out what policy concerns they have. When these questions are answered the TF will develop a set of policy statements that can be used to drive development of technical mechanisms.

The TF then spent time discussing various proposed mechanisms to evaluate their ability to support policy requirements. The output was a brief description of the proposals so that the FRICC can get a feel for the types of mechanisms that may be available.

Finally, Estrin expressed amazement at the success of the video conference technology itself and indicated that she would use it again.

Mills questioned whether our scope on policy was too FRICC specific, and asked about the concerns university campuses and industry might have. Mills also asked if ANSI Routing Architecture or DGP were discussed by Estrin's TF.

Clark expressed concern that the TF structure was out of control, with many interest groups going off and doing their own thing. Estrin added that her TF hasn't picked up all of the issues resulting from the policy statements. Cerf noted that ANTF shouldn't be doing routing mechanism development.

ACTION ITEM: IAB should partition responsibilities and put in place groups to cover the issues raised by Leiner's workshop. Estrin's TF should focus on policy issues. (Clark)

ACTION ITEM: Leiner's group will complete the writeups of its working group reports and distribute them to Estrin's group.

6 End-to-End TF (Braden)

Braden reported that IP multicasting was almost here and pointed out several reasons why it was important that it become a standard: It provides efficient n-way datagram delivery, standardizes IP access to multicast hardware support, and provides a powerful mechanism to locate services using expanding scope searches. Braden indicated his concern about the problem of pushing IDEAs into accepted standards. He cited as an example NETBIOS; a perfect application for multicasting that, for lack of a standard, was rejected by vendors in favor of an ad hoc scheme.

Braden provided a brief history of multicast development. The multicasting effort started in September 1985 and includes two major iterations on the design. The current design is published in RFC-1054 which was published in May 1988, along with source code for 4.3 BSD systems. Host code for Sun OS 4.0 is expected in July 1988, and BBN is developing code for the butterfly and 4.3 BSD routers.

Braden indicated that BBN would exhaust funding before completing the router code. He emphasized that it was very important for DARPA to continue funding this effort.

Braden also took a minute to point out the changes reflected in RFC-1054, which resulted from interaction with NETBIOS and SURAN. He then listed three things that that he felt needed to occur:

1. Continued DARPA support to BBN to complete the code and document multicast router in BSD and butterfly.
2. IAB should advance the host specification to "Draft Internet Standard" status.
3. End-to-end TF will produce applications demonstrating multicasting's usefulness.

Clark questioned whether BBN would make router source code available. Everyone agreed that BBN lawyers were unlikely to support such a request. Braden then reiterated his concern about the process of pushing IDEAs into accepted standards, but the meeting adjourned for lunch before the question was pursued.

7 User Interfaces Application TF (Lantz)

Lantz reported on the activities of the User Interfaces Task Force. A PC-based Voice Server system is now in place at Sun, ANSA, ISI, Olivetti and MIT. Work in progress includes the TI board development at Sun (which does not yet support pause detection), the RAM disk development at ANSA, and the VOX server at Olivetti. The VOX server provides a window system like approach to voice systems, allowing flexible switching between conversations. BBN has made Diamond into a product and adopted the Watson board for use with it. Concern was raised that BBN's decision was made for marketing reasons, and that they had not given sufficient consideration to the protocols. Further, the system is likely proprietary and we do not know if the protocols will be open. Thus, it appears that BBN will not be interoperable; can IAB do anything to prevent this? The discussion gravitated to the desire to promote multimedia exchange within the Internet community, and how to get the needed protocols to the marketplace. Concern was voiced that neither BBN nor CMU were actively pursuing voice, and that no one was filling the void.

An update on current teleconferencing efforts included work being done at Xerox. Lantz related the idea of a simple shared workspace that is highly accessible to facilitate meetings that move from conference room to break room and into the offices. Work is also being done in media synchronization to facilitate transmission over multiple media and playback of multimedia presentations.

Lantz then turned to the topic of video. A video working group was formed and held a meeting on May 10, where they drafted a chart detailing what research was being done where and by who. Lantz then provided a summary of video related issues:

- There is a need for an authoring system to deal with large amounts of data.
- Video is harder in general because people have very high expectations.
- There is a need to categorize uses for video (versus other media).
- Too much emphasis is being placed on T1 quality at low speeds or high quality at high speeds. Users need to be able to select quality or cost.

- DVI system is gaining much greater acceptance than CDI.
- The common research goal is "Workstation Video".

Finally, Lantz added that although all of the initial charges haven't been met, the TF is justified just by the fact that it has gotten nine research groups communicating. Further, he noted that everyone in the TF had benefited from collaboration within the group, and distributed a conference paper that was a result of such collaboration.

8 Scientific Requirements (Liener)

Leiner reported that the Scientific Requirements TF had not met for some time; they are deciding on specific areas to focus on in upcoming meetings. Two possible directions: 1) assemble a group to discuss telescience and its specific requirements or 2) refine requirements from the Telescience Testbed for presentation to IAB.

9 Internet Engineering Task Force (Gross)

Gross reported that the IETF had just held its tenth meeting June 15-17 in Annapolis with 113 attendees. Highlights of the meeting included:

- Thirteen of its seventeen WG met and reported.
- The FRICC met and discussed the RIB.
- Two presentations on TCP/IP activities in Canada were given (John Curley from the National Research Council of Canada and Philip Prindeville of McGill).
- Van Jacobson presented his arguments on why the ARPANET may be behaving like a giant token ring.
- Internet Problem Description Forms (Form 1) and Task Force Agenda Forms (Form 2) were distributed (and are still being collected).
- A new SLIP WG was formed (Drew Perkins, Phil Prindeville and Russ Hobby).

Internet Design, Engineering and Analysis series (IDEAs) were discussed as a document management tool. Their use, status, and that they were not meant to be standards was clarified.

The following IETF forms were introduced:

- Form 1 (Internet Problem Description Form) - to document Internet problems that are observed (and that a WG is addressing). Provides various information about the problem including category, description, suggested approach and cost, time frame, and responsible group.
- Form 2 - documents various information about a WG including charter or goal, expected duration, membership list and criteria (i.e. open or closed), mailing list, last meeting, and accomplishments to date.

Two groundrules were set up for WGs so that they could be better managed: Fill out IETF Form #2 and submit WG reports for IETF proceedings. Gross warned WGs that they would be disassociated if Form #2 and at least one Form #1 were not submitted.

The currently active WG's and their chair (brief statements of charter are available from Phill online):

- Authentication (jis@athena.mit.edu)
- CMIS-based Network Mgmt (cel@mitre-bedford.arpa)
- Domains (louie@trantor.umd.edu)
- EGP3 (mgardner@alexander.bbn.com)
- InterNICs (feinler@sri-nic.arpa)
- Internet Host Requirements (braden@isi.edu)
- Internet Mgmt Info Base (craig@bbn.com)
- Landmark Routing Testbed (tsuchiya@gateway.mitre.org)
- OSI Technical Issues (mrose@twg.com)
- Open SPF-based IGP (petry@trantor.umd.edu && jmoy@proteon.com)
- Open Systems Routing (hinden@bbn.com)
- PDN Routing Group (roki@isi.edu)
- Performance & Congestion Control (mankin@gateway.mitre.org)
- Serial Line IP (SLIP) (ddp#@andrew.cmu.edu)
- Short Term Routing (hedrick@aramis.rutgers.edu)
- SNMP Extensions (mrose@twg.com)
- TELNET Linemode (dab%hall.cray.com@umn-rei-uc.arpa)

10 FRICC (Bostwick)

Bostwick began by enumerating some of the issues the FRICC is concerned with: agency networks, international connectivity, RIB operations and R&D testbed, Gigabit projects, and user services.

Bostwick then provided a brief description of the RIB, which will have a 45 Mbps backbone capacity divided into operations and R&D portions. More details will be forthcoming after the National Science Board convenes August 26-28 to review current plans. Bostwick took the opportunity to express gratitude for the help provided to the FRICC by Phill Gross and the RIB evaluation group.

The FRICC decided that it (rather than DARPA) will fund the Gigabit working group, which will be disbanded when its document is delivered.

11 CCIRN (Bostwick)

CCIRN is the Coordinating Committee for International Research Networking. Bostwick distributed and briefly presented a document which specified the membership requirements of CCIRN, purposes of CCIRN, and details of the May meeting, including those who attended and what action items were made.

IAB asked what they needed to do to support the CCIRN action items. The following action items from the May CCIRN meeting specifically mention IAB:

- Meet and examine the interconnection aspects of heterogeneous systems on different layers. (RARE WG4 and IAB TF)
- Meet with J. Hutton before the next CCIRN meeting to exchange action reports and documentation. (IAB and ICB chairmen)

It was suggested that perhaps the End-to-End or Autonomous Networking Task Force may be appropriate for the former.

12 Funding of the IAB (Clark)

Clark started off the discussion of funding by noting that Bob Braden will be funded half time as Executive Director of the IAB. The DARPA greenstamp at MITRE is supporting Phill Gross for IETF and FRICC related activities. A proposal will be submitted to NSF the third week of July to bring Gross to NRI along with Scott Brimm (part time). There was concern that if the proposal was not processed quickly and completed by the start of the fiscal year (October), things would be tricky.

Lynch suggested that IETF meetings include a small registration fee (e.g. $100) to help cover costs of the IETF. The discussion then shifted to DCA, and that there is no communication with the IAB. It was noted that DCA has no representative on the IAB, and consequently is operating without a communication channel. Perhaps the FRICC should address DCA's membership.

ACTION ITEM: FRICC will talk to DARPA about reassigning greenstamp.

ACTION ITEM: Corrigan will talk to DCEC about DCA.

13 Sunshine Law

Clark raised the question of whether the IAB was subject to the Federal Advisory Committee Act, popularly known as the Sunshine law. The act covers committees that are funded by federal agencies and chartered to give advice to federal agencies. Committees falling under this category are required (among other things) to hold public meetings and make meeting minutes publicly available. The topic of whether IAB gives advice was discussed. Clark brought up specific instances where he thought there may be difficulties. The consensus was that IAB did not give advice, but was a non-advisory technical group. To clarify any doubt about IAB's function, Clark volunteered to find and revise the formal charter he had worked on before.

ACTION ITEM: Clark will draw up a draft formal charter.

14 DMS - Defense Message System (Corrigan)

Corrigan reported on the current status and new requirements for the DMS. He went on to say that in a recent evaluation, neither the e-mail nor the Autodin system were judged to be adequate, and a new system will replace them both. The Phase I architecture will use the X.400 mail system and will be operational in 1993. Phase II is scheduled to become operational in the year 2000, and will completely replace the current system. Corrigan then fielded questions from the IAB about the system.

15 Document Series

The current document system is perceived as inadequate. In the RFC series, all documents are bundled under one title. Finding standards is difficult because newer standards that supercede older versions are given a new name without obsoleting the older document. Second, the name RFC – Request For Comments – has the wrong connotations for official standards. Third, the extended time it requires to get a document published as an RFC, and the extensive peer review such documents receive prior to their submission as RFCs result in documents that are already in final form. Further, the RFC review process rejects few documents, and published documents evoke few comments. Finally, the RFC series does not provide working groups with a mechanism for managing rapidly changing versions of documents during the early period of their drafting.

IETF IDEAs resulted from the need of working groups to manage draft documents that evolve on a week-to-week basis. However, it was viewed with some concern that IDEAs might be taking a life of their own. Although it was never intended that IDEAs would ever be referenced in formal documents, such a reference had taken place. It was pointed out that little could be done to prevent such references, despite disclaimers in such documents indicating their mutability. Second, IDEAs appeared to have archival qualities, as there is no formal policy for migrating IDEA's to RFCs or removing those that did not become RFCs.

Lantz suggested that IDEAs really should be RFCs, since they were drafts seeking comments and that in the case of standards, RFCs were really Requests For Compliance. Gross indicated that RFCs carry "too many fruits in the same basket" – standards, drafts, documents of historical value, etc. Comer countered that this was actually beneficial, because all Internet related documents could be found in one place. Lynch added that vendors finally knew about RFCs, and any change in the current document system would lead to confusion.

A consensus emerged that a draft series was needed, and that having an unrefereed side to RFCs – clearly marked as drafts – would solve the problem. Such documents would not be formally reviewed for content and would be published quickly. In addition, having a separate document listing official standards would solve the problem of finding relevant standards. Finally, task forces and working groups could manage documents any way they want.

Clark brought up the annoyance that RFCs were entirely ascii text and did not permit the inclusion of pictures. He suggested that documents be accepted in postscript form, with authors responsible for getting the document to meet any format requirements. He added that this was a big step, but it would also encourage the Internet community to move towards high quality documents. Postel raised the point that many persons already prefer submitting postscript documents, even though their documents did not include figures. Lantz pointed out that some document processing systems in use could not even generate ascii output (e.g. FrameMaker and LaTeX). Thus, the majority of documents might be submitted in postscript. Postel agreed to draft a proposal for accepting postscript documents. Mills asked if Postel could publish a short note on RFC style. Jon replied it will be included in the above.

ACTION ITEM: Create a document listing official standards. (Postel)

ACTION ITEM: Allow unrefereed RFC's that are clearly marked draft.

ACTION ITEM: Draft a proposal for accepting postscript document submission. (Postel)

The activities of the first day closed with Gross awarding Postel an "ISI - We Make Worlds" patch.

— End of Day One —

The second day began with Clark fixing a time limit for the remaining agenda items. Estrin, Wolff and Leiner were scheduled to leave early, and would be unable to remain for late afternoon discussions.

16 Domain Names

Clark indicated that Mark Pullen had approached him about creating a new top-level domain name "INT" for international organizations not fitting into the current top-level domains. Although "org" was designed for this sort of category, Postel pointed out that names were a sensitive issue. Leiner added that there was a common impression that everything without a country code was U.S. based. An immediate consensus emerged that the issue was not worth debating and that "INT" should be created.

ACTION ITEM: Create "INT" top level domain (Postel to follow up with the NIC).

17 JIF mailing list (Clark)

Mark Pullen communicated that the jif mailing list had become a catch-all for IAB and FRICC related mail. Not being an IAB member, he was not interested in IAB related mail. However, he did not want to be removed because of the FRICC related discussions that take place. Although a new iab-interest mailing list could be created, Liener suggested that this would address a symptom rather than the problem. The IAB does not want to exclude DARPA, on the contrary DARPA should be informed about IAB activities and a mechanism should be found to keep channels between the two groups open. Perhaps the FRICC can provide a hint about how to resolve this.

ACTION ITEM: Address and alert DARPA to our communication concerns. (Clark)

18 Routing

During the course of the first day, Vint had suggested the need for a discussion on routing. He pointed out that instead of assuming a uniform routing scheme within Autonomous Regions, we perhaps should think about a multiplicity of routing schemes within a system. Clark commented that a single decision would be made reguarding each packet, even if the criteria for the individual packets varied. End of discussion!

19 Document Series Again

Braden reiterated the concern about the process of promoting standards for the Internet community. In particular, he expressed a need for a label for draft standards such as multicast. Postel suggested that a draft and final version of each of the required, recommended, elective, and experimental standards would be useful. Postel will explore possible document series variations, and come up with a recommendation.

Braden then asked that the IAB approve the multicast RFC as a draft standard. Estrin's motion to approve RFC-1054 (seconded by Comer) was passed by the IAB.

ACTION ITEM: IP multicasting made a draft standard. (Postel)

ACTION ITEM: Postel will recommend a solution to document series naming problem.

20 Berkeley

The issue of providing input into Berkeley UNIX code was briefly discussed. Vint noted that a conversation with DARPA might be appropriate. The question was asked if the Open Software Group would be more receptive to input, and hence a viable alternative. Braden suggested that some input to Berkeley might be made "informally" through Van Jacobsen. Vint asked what exactly do we want from Berkeley? Braden replied that the Host Requirements document should be adhered to. Mills raised another question concerning input into the next Berkeley version which is to have an ISO stack. Clark said that IAB is not directly concerned with ISO; should we be?

Leiner noted that keeping in mind Internet user interests, we must at least be concerned with the transition to ISO. Gross added that BSD UNIX is the platform for much research, and the issue must be considered in this light.

21 NFS - National File System

Al Spector at CMU has combined VICE and Virtue into a package called the National File System (NFS). Its adoption at campuses across the country will be promoted at an upcoming conference being held at CMU August 23-24. Comer pointed out that the conference had not been brought to the attention of the DSAB, despite Spector chairing one of its working groups. Concern was expressed reguarding the technical merit of Andrew and its extensibility into such an ambitious position. IAB should attempt to stay aware of any further developments.

ACTION ITEM: Comer will look into the status of NFS.

22 Old/New Task Forces

A proposal was made to create a Military Requirements Task Force. It was pointed out that Mike Frankel is already working in the area, and would make an appropriate chair. After some discussion, the general consensus was to move ahead with this.

Clark then relayed DARPA's request for a task force on security. Cerf contended that the IAB should stay out of classified areas. Clark countered that the IAB could not afford to let the military work completely independently, because the IAB needed to know the implications of architectures on both military and non-military concerns. Discussion ensued reguarding IAB dealing with classified issues. Leiner affirmed that the IAB needed to keep open a line of communication between the two groups. Action was deferred due to the absence of Kent and Boesch.

The conversation then moved to the status of the Robustness and Survivability TF. Its chair, Jim Mathis, has not attended an IAB meeting in 2 years and shows no indication of doing so in the future. By unanimous consensus, the TF was closed down and Jim Mathis was removed from the IAB.

Discussion then moved to the task force on conformance testing. Although Ed Cain was its initial chair, he has since resigned. Discussion then gravitated to certification of TCP/IP and higher level protocols. NBS announced that it would start such certifications, though specific references to TCP/IP were conspicuously absent in the announcement. Questions were raised as to whether certification was required, and if its results would be binding. Responding to the contention that this was an IETF issue, Gross wondered if the IETF would be effective given its voluntary nature. Braden countered that directors of labs being certified needed a place to get information, and the IETF was an appropriate mechanism. Gross agreed to pursue the matter further and propose a WG charter.

Gross then clarified the status of the various routing task forces within the IETF:

- Short Term Routing - chaired by Chuck Hedrick, it was originally chartered to publish a RIP standard. In addition, the group spent a lot of time with NSFnet configuration issues.

- Open SPF Routing - chaired by John Moy, will produce an open SPF-based routing protocol. Formerly Open IGP Routing Group. Design documents and code are already being produced.
- EGP3 - Chaired by Marianne Gardner, it should produce a RFC soon. The protocol is an extension of EGP that permits partial updates.
- Open Routing - chaired by Ross Callon, the group is looking at long term routing issues, including policy concerns that require changes in packet headers.

DDN has indicated that it will not fund an EGP3 implementation for the ARPANET/MILNET core. It was pointed out that Merit was becoming the de facto core, which prompted the follow up question if Merit would run EGP3. Gross agreed to mail an overview, status report, and recommendation concerning EGP3 to the IAB list so that the IAB can make a decision on its status.

There was concern that the open routing group had wandered off track. Bob Hinden had originally been in charge, and had produced an IDEA on the requirements for Interautonomous routing. Subsequent activity waned, and Ross Callon took over and expanded the role. It was agreed that Callon's efforts were certainly useful, but could be better pursued under a new task force. Estrin suggested getting Hinden back in charge of a short term routing group, and moving Callon to another TF (e.g. INARCH).

Mills then described the role of the INARCH as lying between policy and engineering. It operates under a different time scale than the IETF. He indicated that the first workshop was useful, but more academic input was required. Cerf wondered if the workshops could include persons from other task forces.

The discussion moved toward the question of timetables. In particular, IETF TFs use "rolling deadlines" for short term issues when firm target dates might be more appropriate. Gross countered that the IETF operates under a 3 year timetable. Two years is not sufficient to cover procurement and distribution.

Braden raised concern about the apparent lack of communication between TFs and WGs. Some of the issues being addressed need to be raised to the IAB level. For instance, the open routing group should make a presentation to the IAB. Mills suggested that the next INARCH workshop be held jointly with an IAB meeting. TF chairmen and selected members of the working groups would attend. The idea of a joint meeting was discussed, and possible topics were suggested. Mills requested that the TF chairmen send him a list of topics that need to be discussed.

Clark asked if a Gigabits task force should be started under FRICC. Bostwick countered that to do so would be premature, though one would probably be needed later. Wolff added that an advisory group would be formed anyway, perhaps it could double as a TF. Gross suggested that Callon's group should be left alone, since they were doing good work. Braden requested that the Open Routing group make a presentation to the IAB about their work.

Possible dates for the joint IAB/INARCH meeting were proposed. IAB will check calendars for January 10-13 or 17-20, 1988. The final decision to be made later with the January 10-13 being a default. Discussion of next IAB meeting (a teleconference) was held. It will be held on October 14 between ISI, BBN, and DARPA.

Note: The October teleconference has since been canceled. However, a teleconference has been scheduled for December 2, 1988. The joint INARCH and IAB meeting is set for January 10-13 in Santa Clara, with the INARCH January 10-11 and IAB

January 12-13.

ACTION ITEM: Create Military Requirements Task Force. (Clark)

ACTION ITEM: Close down robustness and survivability TF and withdraw Jim Mathis from IAB. (Clark)

ACTION ITEM: Close down Tactical TF. (Clark)

ACTION ITEM: Send a list of all official TFs to IAB members. (Postel)

ACTION ITEM: Propose a charter for a Testing WG. (Gross)

ACTION ITEM: Send EGP3 overview to IAB mail list. (Gross)

ACTION ITEM: Have John Moy explain how (and why) their efforts differ from ANSI's IGP. (Gross)

ACTION ITEM: Get Hinden's "Requirements for Interautonomous Routing" published as an RFC. (Gross)

ACTION ITEM: Send Mills list of topics to be covered at a joint INARCH workshop/IAB meeting. (All TF Chairs)

ACTION ITEM: IAB video conference at ISI, DARPA and BBN scheduleded for October 14. Note: Meeting cancelled, with teleconference rescheduled for December 2nd.

23 Core Servers

The LSI-11 mail bridges will be replaced by butterfly gateways that double as EGP servers. However, they will never run EGP3. Mills pointed out that NSF will become core, but that NSFnet policy considerations might arise. Braden suggested that the IETF articulate the issues, and formulate a plan of action for recommendation to the IAB. Comer added that the IAB should recommend to NSF that they are the core and must take appropriate action.

ACTION ITEM: IETF will articulate issues and suggest plan of action to IAB. (Gross)

24 User Services

Leiner reiterated his concern that the Internet does not have reasonable user services for the typical (naive) user who wants to access network resources. Environments are too varied. Wolff added that this was really an end-to-end issue in which the user has a job to get done and is not interested in learning many details of the specific task. Braden and Comer argued that this was an N-squared problem that would require people, and hence, money to solve.

Leiner then suggested the need for mechanisms that automatically route user "help" messages to the right place. Lantz added that this was a hard problem, but related an anecdote in which automatic monitoring had yielded good results. Moreover, good research in automatic monitoring and control is taking place, and the topic is worthy of a task force. Gross countered that an InterNICs and Open INOC WG already existed. Wolff pointed out that the InterNICs TF had been unsuccessful, and should be terminated. Lantz added that because these problems were hard and research was still required, the IETF probably wasn't the right group to tackle them. Comer suggested that there were really two problems: automated network monitoring that dealt with smaller technical issues, and an administrative issue concerning information distribution to answer user questions (e.g. how do I send mail to my friend at Cornell?). Wolff mentioned that a small amount of funding was available (enough to fund a TF chair), and that Merit was obliged to provide resources on NIC machines for disseminating information about how to use the various systems.

Responsing to Cerf's question concerning DARPA's activities in the area, Gross reported that the NIC was staffed with 40 persons, compared with only 6 for the CSNET/NSF NIC. Corrigan added that DARPA was looking to cut NIC funding, particularly in the area of Internetworking. The IAB should find the people in this area and tap them for information.

ACTION ITEM: Create User Services TF; investigate Jill Wescott as chair. (Clark)

ACTION ITEM: Lantz will have his students create list of persons doing research in the area.

ACTION ITEM: Find out what the 40 people at the NIC do (who can do this?).

25 MIB

Braden reported that the current MIB document makes no distinction between hosts and gateways. Some of the defined objects have a clear gateway bias while others should not even be included in hosts, yet the document basically indicates that everything should be implemented. The problem cannot be solved simply by calling it a "gateway MIB". Moreover, because the IAB solicited the draft, fast action is required. Lynch added that vendors were already building systems based on the MIB approach.

ACTION ITEM: Cerf will write a disclaimer paragraph for the introduction, and the MIB document will be made into an RFC.

26 Interoperability

Braden suggested that the IAB needed a transition plan for moving toward ISO applications (e.g. X.400, FTAM, etc.). Corrigan noted that full ISO stacks were being built. Braden pointed out a desire to use ISO applications now, but ISO is still missing the network layer and below. Lantz asked for an explanation of ISODE: Marshall Rose implementation that makes TCP/IP look like

TP4. Corrigan wondered if anyone would buy just the top layers. Braden mentioned that full ISO stacks would be technically risky; TP4 won't function nearly as well as TCP for some time. Clark agreed, pointing out that if migration to the entire ISO stack takes place at once, problems would be discovered serially. Clark conjectured that this would add 2-3 years to OSI development. Mills asked if the ES-IS routing was ready yet: no. Clark asked about the status of conversions to X.400. UM-Express is running on SMTP. NBS and UCL both have SMTP to X.400 gateways, but Gross indicated that the NBS version had solved the addressing problem in a poor way. The user was required to know the address of the mailbridge. Lantz suggested requesting information from Steve Kille about the IFIP 6.5 efforts. Postel suggested that IAB ask someone from IFIP 6.5 group to give a presentation. Braden added that because of the complexities in mapping between SMTP and X.400 address, a group (e.g. IETF) should track addressing experiences with the mail relays. Gross indicated that the only Internet migration plan was DoD's GOSIP. Further, IAB should have a group discussing ISO transition and interoperability based on ISODE. Cerf added that ISODE would be a good mechanism to gain experiences with ISO applications. Corrigan suggested that an ISO version of Host Requirements would be useful. Clark suggested that Marshall Rose and Larry Landweber would be good candidates for analyzing transition strategies.

ACTION ITEM: Convene Transition TF (Cerf).

ACTION ITEM: Obtain a status report from Steve Kille on European efforts.

ACTION ITEM: Develop an ISO version of Host requirements (Corrigan).

27 NSFnet (Wolff)

Wolff reported that the new NSFnet backbone started operation July 1, with the old NSFnet scheduled for decommissioning on July 18. Regionals have already been moved to the new backbone and things seem to be working well.

Wolff then reported on a June 23 meeting at the Carnegie Corp. in New York with the American Council of Learned Societies (a humanities umbrella group). The group was seeking NSF and State Department support to run a link from San Francisco to Moscow.

A DoD and Commerce Dept. sanctioned mail service has been provided by two X.25 circuits since 1985, connecting to a network of Soviet academies including those in Nicaragua and Cuba. The link will be replaced by a T1 satellite link, and the group is seeking guidance whether to convert to SMTP or X.400 and possibly to support IP to connect to the Internet. Wolff indicated that an Internet connection was not possible because of supercomputer access. Estrin mentioned that an application level gateway would be appropriate; everyone agreed. Clark noted that a SMTP-SMTP gateway would be easier to build than one for SMTP-X.400. Postel wondered if the same system (Intermail) that connects commercial networks to the Internet could be used. MMDF for SMTP and UCL's X.400 gateway software should also be considered.

28 Naming and Directory Services

The question was asked whether X.400 and X.500 should be brought into the Internet. Clark asked if the IAB should be taking concrete steps to bring about naming and directory services; If so, when and how concrete?

Clark reported that Larry Peterson's work was drawing comment because it wasn't X.500. Comer responded that Peterson had documented the requirements for yellow pages and white pages service, and had built a prototype that was well received by the InterNICs and CSNET groups. Further, NSF funded him to continue the work. However, Comer also noted that the scope of Peterson's work is long term.

Clark added that Peterson had defined an access method independent of operational heterogeneities rather than internals. This gives two approaches: 1) build on heterogeneous access systems 2) use X.500 since it is already here and standard.

Cerf pointed out that the IAB could take a leadership role in the development of these services and help to fill the void, similar to what was done in the network management standards area. The consensus emerged that the IAB lacked sufficient information to make a decision. Lynch noted that it would be helpful to get a briefing on X.400 and X.500, perhaps from Jim White. We should also ask Peterson to articulate the differences between his approach and X.500. Corrigan asked if the Domain Name System was relevant. Postel responded that DNS was a very powerful and general tool that could support such functions.

ACTION ITEM: Obtain a status report from Peterson and a comparison of his work with X.500. (Comer)

ACTION ITEM: Ask Jim White to give the IAB an overview presentation on X.500.

ACTION ITEM: Convene a decision group to make recommendation concerning this issue (after Peterson has been contacted). (Clark, Gross, Comer, Bostwick)

29 Private E-mail

Cerf asked simply, where is private e-mail and what options are available to facilitate progress? Clark noted that Steve Kent was pursuing this topic and, as reported at the last IAB meeting, has gotten an agreement from RSA. Clark also noted that Kent did not as yet have an implementation plan. Lantz mentioned that the IFIP 6.5 group was addressing security issues, and that we should perhaps investigate what they are doing. Mills asked if the Rose/Farber effort (Trusted Mail) had received due consideration. Vint suggested that the IAB could convene a group to review the options and make a recommendation (as was done for the network monitoring issue).

ACTION ITEM: Form review group to make recommendation concerning privacy in e-mail.

30 Guest Presentation (Don Tolmie of LANL)

The meeting concluded with Don Tolmie's report on ultra-high speed networking and the High Speed Channel (HSC) project at LANL. Tolmie presented the motivation, technical information, and current project status and direction for their 600 Mbps (sustained) network. This bandwidth is used by scientists on supercomputers to generate real-time video displays.

31 Summary of Action Items, Recommendations, and To Do

- DSAB Report
  - IAB should make certain that bad TCP/IP code is not distributed with Mach. End-to-End TF to contact Eric Cooper to find out the status of Mach and investigate input channels. (Braden and/or Jacobsen)
  - DSAB activities should appear in the Internet Monthly Report. (Comer)
- Leiner Workshop Report
  - Complete WG reports from the Leiner workshop; reports will layout issues and specific working items. Autonomous Network TF to receive completed reports. (Leiner)
  - IAB should make certain TFs and WGs are in place to cover the output of Leiner workshop. (Clark)
- Autonomous Network TF Report
  - Autonomous Network TF to establish relationship with IETF Open Routing WG. (Estrin)
- End-to-End TF Report
  - Ensure that IP multicast code for the Butterfly gateway is completed. Inform DARPA of the need for continued support to complete and document the BBN multicast router. (Clark/Braden?)
  - Multicast RFC to be declared a draft Internet standard. (Postel)
  - Provide meaningful demonstrations of multicast use. (Braden, E2E TF)
- IETF Report
  - Compose a list of IETF WGs and their charters to be distributed to the IAB. (Gross)
- CCIRN Report
  - A new top level domain "INT" is to be created; see that this is done. (Postel)
  - Examine CCIRN action items and what IAB can do to support them. (Bostwick/Clark)
- IAB/IETF Funding
  - FRICC should talk to DARPA (Mark Pullen) to make certain that the greenstamp is reassigned. (Bostwick)

- Talk to DCEC about their involvement with the IAB/FRICC, and investigate what is going on. (Corrigan)
- FRICC to address issue of DCA's membership. (Bostwick)

- IAB in the Sunshine
  - Draw up a charter for the IAB and distribute to IAB members. (Clark)

- Documentation Series
  - Create and maintain a document listing RFCs which reflect official standards and where to find them. (Postel)
  - Codify a solution to problem of naming various types of documents such as drafts, standards, etc. (Postel)
  - Draft a set of guidelines for experimenting with graphic document submission. (Postel)
  - Draft and distribute style notes for writing RFCs. (Postel)
  - RFCs not yet considered Internet standards are to have a faster turnaround time. (Postel)

- IAB/FRICC group mail (jif)
  - Contact DARPA about active involvement in IAB activities. (FRICC)
  - Update mailing lists to reflect new DARPA personnel associated with IAB. (Postel)

- Berkeley
  - Point out to Mark Pullen the need for Berkeley to take host requirements paper as input. (Clark)
  - Contact Van Jacobsen and discuss IAB concerns as a possible indirect method of input. (Braden)
  - Contact Open Software Foundation as an alternative to Berkeley. (Cerf)

- National File System
  - Talk with Al Spector; investigate status and technical merit of ANDREW and the proposed transition to National File System. (Comer)

- Old/New Task Forces
  - Create a Military Requirements TF; pursue discussion with Mike Frankel as tentative chairman. (Clark)
  - Terminate the Robustness and Survivability TF. (Clark)
  - Terminate the Tactical TF. (Clark)
  - Coalesce and distribute a list of all official TFs. (Clark/Postel)
  - Contact Steve Kent and Brian Boesch reguarding status and possible new direction of Security TF. (Clark)
  - Propose a charter for a Testing TF (Gross).

- Encourage Hinden to publish his "Requirements for Interautonomous Routing" as an RFC. (Gross)
- Encourage John Malloy to finish the document which explains the differences between his WG's work and that of ANSI. (Gross)
- Write and distribute to the IAB a synopsis of EGP3, and make recommendations reguarding its implementation/distribution. (Gross)
- Contact Ross Callon and discuss possibility of a New Architecture TF. (Clark)
- Invite the Open Routing WG to make a technical presentation to IAB. (Note: This nay occur instead under the auspices of INARCH workshop.)
- Task Force chairs are to compile and send to Dave Mills a list of possible topics and people to serve as a basis for presentations at the INARCH workshop which is to be held jointly with the next IAB meeting. (TF chairs)

• Core System

- Bring EGP3 document to the attention of Merit/IBM. (Gross)
- Officially notify NSF in writing of the serious nature of the responsibilities that will fall on them as the new core system.
- Have IETF articulate the issues in having NSFnet assume "core responsibilities" and recommend a plan of action to the IAB. (Gross)

• User Services

- Encourage Hedrick and Kroll to clean up and submit as an RFC their how-to document on system independent Internet Mail. (Gross)
- Examine the NICs activities and bring observations to DARPAs attention.
- Compile list of persons pursuing research in the area of automatic monitoring and control. (Lantz)
- Create a User Services TF; pursue discussion with possible chairs. (Clark)

• MIB

- Compose an introductory note dealing with host-vs-gateway issues for the MIB document before it is released as a draft Internet standard. (Cerf)

• Interoperability, ISODE, X.400, etc.

- Convene the Transition TF (Cerf).
- Get an ISO version of the Host Requirements RFC. (Corrigan?)
- Ask Steve Kille to give a status report on the group doing IFIP 6.5 work.
- Talk with Peter Kirkstein about European interests. (Clark)

• Naming and Directory Services

- Ask Larry Peterson to articulate the differences between his naming system and X.500 (Comer).
- Ask Jim White to present an X.400/X.500 briefing to the IAB.

- Convene a review committee to examine naming and directory service proposals (Peterson, X.400/500, DNS, ...) and make a recommendation. (Clark, Gross, Comer, Bostwick)

- Connectionless Network Services
  - Checkout European-US teleconferencing options. (Bostwick, a CCIRN action)

- Private E-mail
  - Convene a review committee to examine major secure email proposals. (Cerf, Clark ...)

- Administrivia
  - Next IAB meeting will tentatively be a video conference between ISI, DARPA, and BBN on October 14. **Note: Meeting canceled, and new teleconference scheduled for December 2nd.**
  - Check calendars and pursue dates for next full IAB meeting and joint INARCH workshop off-line. Possible dates are January 10-13 or January 17-20 with lack-of-action default being Jan. 10-13. **Note: Finalized meeting date is January 10-13, 1989 (INARCH 10-11, IAB 12-13). Meeting to be held in Santa Clara.**