The ICFA Networking Task Force

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ICFA stands for the "International Committee for Future Accelerators". It meets typically twice per year and has a membership of about fifteen people, who are normally "regional" representatives, where Europe, the USA, etc. are the "regions". The main laboratory directors from each region are often ICFA members, but that is not guaranteed, since the membership for each region is limited to just a few people. At the two meetings I have attended the Directors-General of CERN, DESY, FNAL, KEK, and SLAC have all been participants. But there are also other participants from Russia, China, Canada, ECFA etc. At the end of 1996 the chair passed from Peoples (FNAL) to Wiik (DESY). In many ways ICFA is a "Summit Meeting" for world-wide particle physics.

There has been a growing and more explicit recognition, over the last one to two years, by the ICFA members of the importance of good world-wide collaborative networking for our field of research. The university-based groups especially have pointed out the problems for them of both taking a full part in the life of their university and fully participating in experiments at accelerator labs if the network bandwidth available and the quality of service provided are poor. Given the truly international nature of the HEP community, the multiple service providers involved, the continual growth of Internet traffic, and the changing topology of the parts of the Internet used by HEP traffic, it is not simple to monitor and maintain satisfactory performance on all of the hundreds or thousands of routes between home institutes and accelerator labs which we are using.

I became involved in this question when I was asked to give a talk about computing and networking in HEP to an "ICFA Symposium" in KEK late last fall. This was not one of the regular ICFA meetings but a special event with about 100 attendees, which is held once every three years. The main thrust of that meeting concerned R&D and plans for accelerators over the next decade(s), and discussion of what physics can best be done where. My talk was more or less in a category of its own. My slides can be consulted at http://nicewww.cern.ch/ davidw/public/ICFA.htm.

In the discussion which followed people were wondering about whether ICFA

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should itself try to set up a group of some form to see if there are any steps that they could take themselves to improve HEP networking. After the KEK meeting I was officially asked by ICFA to come to their next meeting, held in SLAC at the end of January 1997, with some more specific proposals. It became clear in discussions, both inside and outside the meeting, that while there is strong general support for the idea of ICFA taking a leadership role in the field of international networking for HEP, there are a number of points which need to be addressed with care. Probably the two most delicate issues are:-

* What form should an ICFA group or panel take?
  - o Who will be on it?
  - o How will it relate to existing bodies active in HEP networking?
  - o How will it report to ICFA?
* What exactly will this grouping try to do?

The formal outcome of the meeting, with respect to this topic, was contained in the following text.

RESOLUTION

High Energy Physics is becoming an ever more global discipline. Current large collaboration in accelerator based and non-accelerator based experiments are becoming more geographically spread and thus need effective high-speed communication to work efficiently. The need for bandwidth in digital communications is growing for data analysis and for video conferencing at the same time that existing links are becoming ever more crowded. It is important that the HEP community understand the present situation and existing plans for the evolution of our international links so that it can try to influence national authorities to move in appropriate directions.

A small group will be set up to report to ICFA at its summer 1997 meeting on the terms of reference of a possible future ICFA Working Group on Communications in High Energy Physics; this group will also present as much factual information on the issues as is possible to gather before that time.

The members of the small group will be: David Williams (Chair); one member each from DESY, Fermilab, KEK, and SLAC; three other members can be added if needed.

I will return later to the question of membership, but there is some background that I would like to explain first.

Before the ICFA meeting at SLAC I had traveled up to Berkeley to meet and discuss with James (Jim) Leighton, Director of ESnet. It will be obvious to all of you that ESnet has a crucial role to play in any ICFA networking efforts.

Jim convinced me that one of my initial ideas, namely that it would be best to keep any ICFA working group small, was flawed. He pointed out that by its very nature international HEP networking involves many different people and organisations, and we need all of these people to feel involved in the ICFA efforts. It is not sufficient to have captured the interest of several high-powered lab directors if the people who have been working in the field, often for the past 10-15 years, do not back these efforts.

So, one of the jobs of the small group referred to in the ICFA resolution above will be to make a proposal for how to manage this apparent conflict between a small group (to stay effective) and a larger group (to keep us all involved).

It is clear that the ICFA Working Group should not, of itself, generate the need for a lot of travel. We should practice what we preach and largely work by e-mail and video-conference, with a minimum of face-to-face meetings. However there are some opportunities for face-to-face meetings which are too good to miss, and one of these was CHEP'97.

On the Sunday before the conference we held a "Mini-Workshop on HEP and the Internet", which was attended by 37 people. The morning session was devoted to a status report and general discussions related to the ICFA initiative. The afternoon session was more specifically devoted to performance monitoring issues. There were also two well-attended follow-on sessions, held on the Sunday and Tuesday evenings, to work on the details of how we wish to respond to ICFA. Thanks are due to all who prepared material and participated in the workshop and the evening sessions, and especially to Les Cottrell of SLAC, who did most of the Web-based preparation for the meeting.

One of the main outcomes of the workshop was to define a set of working groups, and a timescale for preparing our response to ICFA.

The Monitoring Working Group will be chaired by Les Cottrell (SLAC) and will have a fairly large membership. The mandate of the group is:-

* As agreed in Berlin, to deploy the ESnet monitoring package to more sites (Canada, CERN, DESY, INFN, IN2P3, KEK, KFKI, MSU, and Rutherford all volunteered).
* For 30 June 1997 prepare an interim report on the present performance of HEP connectivity
* Enhance the ESnet monitoring package by incorporating additional features or tools as appropriate
* For 31 March 1998 prepare an updated performance report, including, where possible, the identification of any key bottlenecks or problem areas

The Remote Regions Working Group will be chaired by Hans Frese (DESY), probably with a fairly small membership, but including representatives from regions such as China and South America. The mandate is:-

* For 30 June 1997 prepare a report on the present status of networking for ICFA's "remote regions" (i.e. everything not in N. America, Europe and Japan, and specifically including China, India, FSU and S. America). Where possible indicate costs in a similar way to that outlined below for the Status WG.
* For 30 August 1997 prepare a report on the existing use of satellite technology for DESY-FSU connectivity, with indications of the pros and cons of significantly extending this approach.

The Present Status Working Group will be chaired by Roman Tirler (Saclay), with a fairly small membership. The mandate is:-

* For 30 June 1997 document how ICFA labs and institutes, except those in remote regions (see above), obtain their Internet connectivity. Indicate approximately how much this connectivity costs on an annual basis.
* This work needs:-
  o A list (spreadsheet?) of all networks and special links on which HEP networking depends
  o The annual cost of those networks and links
  o If known, the organisation which pays the bills
  o If known, the approximate % use of HEP

One of the most difficult jobs will be to analyse the requirements of the HEP community. Harvey Newman (Caltech) will chair the Requirements Analysis Working Group. Its mandate is:-

* For 30 September 1997 (interim version) and 31 December 1997 (final version) document the wide-area networking requirements of the major future HEP experiments. This will require an analysis of the computing models proposed or anticipated for at least: Fermilab Run II, BaBar, Belle, RHIC, HERA beyond the year 2000, and LHC. It should as far as possible distinguish between needs for:-
  o basic Internet services (e-mail and Web), as required by all scientists
  o likely heavy use of collaborative groupware, including integrated video-conferencing tools, inside HEP experiments
  o data movement over the network
* The report should attempt an analysis of the financial and scientific costs associated with failure to exploit networking sufficiently.

When all of these groups have produced at least preliminary reports, it will be the task of the Proposal Working Group, chaired by Mark Kaletka of Fermilab, to generate a proposal for consideration by ICFA. The mandate is:-

* Using the input from the other Working Groups as a basis

* Plus a study of likely cost and technology evolution (which could eventually be spun off)
* For 30 March 1998 (interim report) and 30 June 1998 (final version) produce a set of recommendations to ICFA for actions to improve networking in the HEP community.

At the time of writing it is expected that the ICFA Networking Task Force will meet on 8 and 9 September 1997 in Santa Fe. There will be some overlap (to be defined) with the ESnet Steering Committee and ESnet International meetings on the following days. The agenda will cover presentation and discussion of the working group reports which are already available (in principle, from the Monitoring WG, the Present Status WG, and the Remote Regions WG). There will also be a first discussion on ideas for the Requirements WG interim report

A two day meeting should also be held in April 1998 in Europe, with the location and exact dates to be defined. The agenda will include presentations and discussions of all WG reports, with the aim of considering, refining and hopefully approving the proposal to ICFA.

We also asked ourselves whether there are any items which are so urgent that they cannot even wait for interim reports from our working groups? There was agreement in Berlin that we should try to make ICFA sensitive to some of the current initiatives to improve the Internet infrastructure used by HEP in Europe and the USA. The following form of words has been tabled for discussion inside the ICFA-NTF:-

ICFA members should be aware that the effectiveness of networking at their institutes and laboratories is often limited by the infrastructure presently available to carry academic and research traffic on the Internet. ICFA members should also become informed about moves to try to enhance this infrastructure both in Europe , where a rapid upgrade of TEN-34 to "TEN-155" is being discussed, and in the USA. Turning these ideas into reality on the timescale of the next twelve months could be extremely beneficial to HEP, and to other scientific and academic communities. We would encourage individual ICFA members to follow these initiatives in their country or region, and to give them their general support.

For reference, our proposal for the formal mandate of the ICFA-NTF, which will hopefully be endorsed by ICFA at its July meeting, follows.

The ICFA Networking Task Force (ICFA-NTF) should:-

1. Document and evaluate the status of networking used by the whole ICFA community, and analyse its likely evolution until the turn-on of LHC. This work should especially take into account:-
   o the needs of users based at university institutes everywhere to participate

in the life of their home university while taking a full part in experiments at accelerator (and other) laboratories around the world.
   - o the needs of experiments to transfer physics data on a regular basis with predictable performance
2. Make specific recommendations or proposals, as appropriate, to ICFA in order to improve the overall situation of HEP networking.
3. Seek approval from ICFA for the membership and internal structure of the ICFA-NTF
4. Present reports on progress and plans, as requested by ICFA.
5. Provide a final report and recommendations to ICFA by the end of 1998.

Organisation and membership

The ICFA-NTF will institute a number of working groups to perform studies and to develop recommendations. The Networking Task Force will consist of a steering committee, composed of the working group convenors and others designated by ICFA, and of a larger group of Task Force members, who will also serve on the working groups. Membership of the Task Force will be open to all those interested and willing to work.