South Pole Computing and Communications Working Group Report - 1996

COMMUNICATIONS

The communications capabilities at the South Pole must continue to improve in order for the major science projects to succeed. Already the benefits of the higher bandwidth and Internet connection have had a major impact on the way we are doing science at the Pole.

Now that we have been able to evaluate the day to day experience with the Internet connection to the Pole for the past three years, we can summarize our future needs with three words: Availability, Performance, and Bandwidth, in that order.

The South Pole User's Committee believes that nearly continuous coverage at T1 data rates can be achieved in the next few years. As a first step towards this goal we have prioritized these communication recommendations for this year.

Short Term:

1) Upgrade the Malibar-Miami link to T1 rates with multiplex voice capability.

This has our highest priority. The current 128 Kbps link is a major bottleneck in the communications system.

2) Upgrade the GOES-3 ground stations to T1 rates in a serviceable and documented way.

The technology to do this exists, but the funding does not. The proposed plan to upgrade to 1/3 T1 is a wasteful distraction. The funds should be found to upgrade to T1 now.

3) Provide remote phone service between the station phone system (PBX) and CONUS.

We think that this phone service may be best implemented by multiplexing the GOES link, but we should consider the rapidly developing Internet Phone technologies as an alternative.

4) Provide fax capability to CONUS.

This may require some store & forward capability at Malibar, perhaps with special software.

To build on the infrastructure, we need to plan now for future growth of the communications infrastructure. The following list is our long term recommendations:

Long Term:

1) 24 hour connectivity with the south pole.

a) Continuous communications would support remote observing programs at the CARA facilities.

b) The AMANDA and SPASE collaborations could move much their data analysis to machines at the pole, which would allow results to be obtained much more quickly.

c) The window for interaction between CONUS and Pole will be widened, resulting in much more efficient interaction with winter-overs.

d) The longer availability would allow better use of CONUS experts (such as software engineers).

2) Pursue acquisition of other satellites (GOES?) to complement the two we use now.

3) Emphasize connectivity convenience, times, and quality rather than very high bandwidth.

While we could obtain more bandwidth with TDRS, TDRS does not provide the full-duplex connectivity described above. We think our money will be better spent to increase the cadre of GOES type satellites in the future and supply more bandwidth, satellite availability and performance with interactive, internet capable pathways.

NETWORKING

The following items were identified at the User's Meeting that required action:

1) Need a documented, well thought out and well laid out network plan for the Station.

2) Create a management plan to allow for individual science project's subnets to be integrated into the Station LAN.

3) Move all science networking to subnets that run only TCP/IP protocol.

4) Eliminate multi-protocol nets, creating single protocol networks using routers to bridge over to other protocols.

In addition to the items above, we have some comments:

The science community's dependence on computing and communications is growing fast, but the amount of money necessary to fulfill these needs is not keeping up to this growth. We realize the budgetary restrictions of these times, but we feel that computing/communications should receive a higher percentage allotment than it has in the past. The users are willing to designate what areas of the budget are less important and choose to help defray these costs by electing to receive less money in other science areas.

Not only are the users willing to help defray costs, but also we are willing to accept risks to speed up the process of providing new levels of support. The lifetime of most science projects is too short to accept a conservative approach to the implementation of new technology. GOES-2 is a good example of risk taking that provided the station with Internet access years earlier than a more cautious approach would have done. However, the necessary follow-up did not occur: the ground station hardware was not upgraded to acceptable quality after the first year of operation, which put the platform at unacceptable risk in subsequent years.