

Exchange of OCONUS Meteorological Data with the Research Community Using Internet2

FY 2005 Proposal to the NOAA HPCC Program

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Proposal Theme: Exchange of OCONUS Meteorological Data with the Research Community
Using Internet2

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Exchange of OCONUS Meteorological Data with the Research Community Using Internet2

Proposal for FY 2005 HPCC Funding

Prepared by: Tom Sandman

Executive Summary:

The National Weather Service (NWS) regions located outside the continental United States (OCONUS) currently collect significant amounts of data that have high potential value to the meteorological research community. The community of interest for this data includes NOAA, universities, other government agencies, and the private sector. Example of the types of data that could be transmitted to researchers in NOAA and the academic community includes high resolution Japanese satellite data, WSR-88D (NEXRAD) Level II radar data, and GIS data. Virtually, the entire community of interest for this data has connectivity to the Internet2 with the exception of the NOAA organizations located in Alaska and the Pacific. Connectivity to the I2 will provide a means for these regions to distribute this data to universities, the private sector, and to other interested research organizations. In addition, the two regions can benefit significantly from access to large research data sets that are only available from sources in the CONUS. Again, limitations of bandwidth preclude the Alaska and Pacific regions from receiving these data sets.

The two NWS regions have agreed to act as the Internet2 points of presence for all other NOAA line offices located in the Pacific and Alaska geographic area, including the National Ocean Service and the National Marine Fisheries Service, to connect to the Abilene network. This will permit these organizations to participate in the NOAA IPv6 network effort along with their CONUS counterparts. The NOAA IPv6 network initiative was funded through previous HPCC proposals, and is implemented on the Internet2, Abilene backbone network. The objective of this effort, which currently connects most major NOAA CONUS locations, is to provide the capability for the implementation of an IPv6 network prototype. Alaska and the Pacific regions were not included in previous IPv6 HPCC proposals.

This proposal will provide the resources necessary to enable the NWS Pacific and Alaska regions to provide data to the research community, the private sector, and other government agencies through direct connections to the Internet2 at those locations. In order to obtain this connectivity to the Internet2, the Alaska and Pacific regions will be establish ongoing relationships with the University of Hawaii and the University of Alaska. These universities, which currently have high-speed connectivity to the Internet2, will serve as "on ramps" to the Internet2, Abilene network. The two regional Internet2 connection points will require state of the art routers to provide support for the NOAA IPv6 network initiative. NOAA will reap significant benefit by having this connectivity for its line offices located in Alaska and Hawaii.

Problem Statement:

While NOAA has made great strides in the provision of a high speed networking capability through its use of the Internet2, Abilene network throughout the continental United States (CONUS), NOAA locations in Alaska and the Pacific do not currently benefit from this capability. As a consequence, the meteorological research community; that includes NOAA laboratories, universities, the private sector, and other government agencies; are currently unable to receive the large meteorological data sets that are generated outside the continental United States (OCONUS). These data; generated by weather radar, earth observing satellites (including Japanese satellites), and GIS systems; have the characteristics of very high spatial resolution and in some cases high temporal resolution. Where, in the past, NOAA has faced the challenge of transmitting a few hundred megabytes per satellite pass, it is now experiencing datasets of tens of gigabytes. As a consequence, OCONUS regions experience a huge bandwidth deficit when trying to disseminate or receive these datasets to or from researchers over T-1 or similar communications lines.

NOAA has addressed the problem of disseminating large experimental data sets to the research community in the CONUS through its use of the Internet2, Abilene network. For example, WSR-88D (NEXRAD) Level II radar data from 121 radars is currently being transmitted to the research community over the Internet2. To date, however, a similar capability does not exist for the Federal Aviation Administration or Department of Defense WSR-88Ds located in Alaska and the Pacific. This proposal seeks to provide Internet2 connectivity for NWS and other NOAA line offices located in these regions. Provision of this capability will have the following advantages for NOAA:

- Provide adequate bandwidth to support the transmission of large meteorological and other data sets between Alaska and Pacific NOAA organizations and the research communities located in both the CONUS and OCONUS.
- Establish points of presence (PoPs) in Alaska and Hawaii for the connection of all NOAA line offices to the Internet2 Abilene network.
- Permits NOAA line offices in the two OCONUS regions to participate in the Internet Protocol version 6 (Ipv6) network which has been implemented between major NOAA CONUS locations. This network provides an investment in engineering expertise, cooperation and planning. It also provides an upgraded and consistent routing infrastructure for the participating NOAA sites. It helps position NOAA for the use of advanced protocols such as reliable multicast. And finally it provides a template for a possible future NOAA-wide transition to the IPv6 protocol.

Proposed Solution:

In order to provide the necessary bandwidth to transmit large experimental data sets between NOAA locations in Alaska and the Pacific and NOAA researchers, to establish PoPs for NOAA line offices located in these geographic regions, and to permit participation in the NOAA Ipv6 network, it is proposed that the following be implementation steps be taken:

- Provide connectivity between the NWS Pacific Region Headquarters (PRH) and the University of Hawaii Internet2 PoP at the rate of 10 Mbps. PRH has already made contact with the University of Hawaii CIO and he has offered to provide this capability at a very nominal cost to NOAA. This Internet2 PoP will be managed by the NWS and serve as the “on ramp” for all Pacific area NOAA line offices wishing to connect to the network. The expense of implementing the Pacific PoP will be funded by this proposal along with a portion of the recurring costs for one year. All future costs of managing and provisioning the Pacific PoP will be borne by the NWS and other participating line offices.
- Provide connectivity between the NWS Alaska Region, Fairbanks WFO, Anchorage, Alaska, and the University of Alaska located in Fairbanks, AK. The Fairbanks WFO is on the campus of the University of Alaska, and has connectivity to four other NWS locations via the Alaska Regional IP MPLS wide area network. This will actually establish five Alaska PoPs to facilitate the connection of NOAA line offices to the Internet2 and permit these organizations to receive and disseminate large research data sets and participate in the NOAA Ipv6 network. HPCC funding will be required for the majority of the non-recurring implementation cost and the first year recurring cost. The NWS and other participating line offices will assume the cost of administering and maintaining future connectivity to the Internet2

Analysis:

Connection to the Internet2 Abilene network in the Pacific and Alaska regions will return immense benefits for the NOAA meteorological research effort by providing unique data sets generated in those geographic areas to the research communities and making large data sets, including satellite model data, available to researchers in Alaska and the Pacific. It will also provide points of presence for Alaska and Pacific regional connectivity to the Internet2, and allow NOAA line offices in these regions to participate in the NOAA IPv6 network.

Performance Measures:

Milestones/Deliverables

Month 1	First coordination and planning meeting
Month 2	Circuits and routers ordered
Month 5	Routers and circuits installed
Month 6	Connections made to university Internet2 points of presence
Month 8	Alaska and Pacific regional data available on Internet2
Month 9	Alaska and Pacific regional connections made to the NOAA IPv6 network
Month 12	Finalize website/report